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THE ARCTIC EXPEDITION.

V.

FROM RITENBENK TO UPERNIVIK.

OUR latest news of the Arctic Expedition, brought home by Captain Allen Young, was dated the 26th of July, off one of the Cary Islands, but it only commenced from leaving Upernivik, and left a gap between the time of parting company with the 'Valorous' at Ritenbenk and the arrival at Upernivik. This gap has now been filled up by the arrival of the Danish brig 'Constance,' at Copenhagen, on Tuesday, the 16th of November, with a bag of letters from the 'Alert' and 'Discovery.' The news thus received is only interesting in itself, but completes the history of this great national enterprise up to the 26th of July, which otherwise would have been fragmentary.

It will be remembered that the 'Valorous' left Ritenbenk for the coal-mine in the Waigat, at 4 A.M. of July 17th.* The 'Alert' and 'Discovery' followed at 6 A.M.; threading their way down the Waigat, through countless icebergs. Although keeping a sharp look out for the 'Valorous,' she was not seen until the expeditionary ships were several miles dead to leeward. Captain Nares then hauled to the wind and beat up, as he had sent no private letters from Ritenbenk. Commander Markham had a whale-boat all ready, and intended himself to take the letters on board, but a thick fog came on, and it would have been almost madness to have attempted to look for the 'Valorous' in the maze of drifting bergs, so the captain, very wisely, altered course for the mouth of the Waigat. Whilst they were beating up towards the 'Valorous,' the officer of the watch, thinking he was going to weather an iceberg, stood on, but the ship drifted bodily down on it, and all the boats on the port side were as nearly as possible lost. The 'Alert' scraped right along the side of the berg, but providentially without serious damage.

On the night of Saturday, the 17th, the fog was so dense that it was determined to make the ship fast to a berg, and await clear weather. They sailed quietly up to a large solid-looking mass, and lowered the ice-boat with David Deuchars, the ice-quartermaster, Reuben Francombe, a maintopman, and two other hands, to drill a hole and make fast an ice-anchor. Deuchars, however, had no sooner struck the ice, when a loud crack was heard, followed by a tremendous report and crash. The berg had calved, sending Francombe, who was actually standing on the calf, flying out into the water, whilst Deuchars was thrown head downwards into a rent, by the rolling of the main piece, and the ice-boat was nearly swamped by the commotion of the water.

Commander Markham immediately lowered the cutter, and went off in her to render assistance, not knowing whether the men and boat were safe. To his great relief he saw the men emerging from a sheeting mass of ice fragments. They had had a wonderful escape, but no one was seriously hurt.

It was a good thing when the 'Alert' and 'Discovery' were well clear of this dangerous Waigat, and making their way north, round the Swarte-huk. By 8 A.M. on Sunday they were off the Omenak Fjord, with a fair wind and heavy rain, which was welcomed as an active agent in rotting the ice in Melville Bay. On Monday the 19th of July, at midnight, they arrived off the little Danish settlement of Proven. Here they engaged Hans Hendrick as dog-driver for the 'Discovery,' and fortunately he consented to come without his wife and children. Hans served in all three American expeditions up Smith Sound, and has had much experience at the work. A dozen more good dogs were also procured, ten for the 'Alert,' which makes the number up to 34, and two for the 'Discovery,' making her number 27, altogether 61 dogs.

On Tuesday all the executiye officers were engaged in surveying the harbour of Proven. Commander Markham and Lieutenant Parr worked one theodolite, Lieutenants Aldrich and Giffard another, and the officers of the 'Discovery' a third; while Lieutenants May and Egerton sounded. Commander Markham and Lieutenant Giffard got good observations for dip and intensity. Dr. Moss had been busily engaged with the surface dredging, finding many organisms under the microscope that were new to him.

Information was obtained at Proven respecting the season and the state of the ice. The whalers had not been able to get through Melville Bay at first, and returned to Upernivik, where they remained eight days. They made a second attempt in about the first week in June, and got safe through. The summer at Proven had been quite as late, allowing for difference of latitude, as at Godhavn; snow was covering the hills, and in some places coming down to the water's edge. Northerly winds had been almost constant. In March it blew from the north fourteen days, in April seventeen days, in May no less than twenty-six days, and in June nineteen days, so that there

* See *Geographical Magazine* for October 1875, p. 299.

must have been a remarkable clearing out of the ice.

On leaving Proven, at 5 P.M., on Wednesday the 21st (the 'Alert' towing the 'Discovery'), the two ships proceeded to the far-famed "loomery" at Hope Sanderson, the furthest point reached by gallant old John Davis in 1587. The quaint name was given to this magnificent cliff by its discoverer, in honour of one of his supporters, a merchant of Bristol. We passed it in 1850, just a month earlier, and Hope Sanderson is thus described by our dear old messmate Sherard Osborn:—"Well worthy is it of the name of one whose liberality had tended to increase England's maritime fame; and the Hope's lofty crest pierced through the clouds which drove athwart its breast, and looked afar to see 'whether the Lord of the Earth came not.' Under its lee the water was a sheet of foam and spray from the fierce gusts which swept down ravine and over headland; while against the base of the rocks, flights of wild-fowl marked a spot famous amongst Arctic voyagers as abounding in fresh food."

A quarter of a century passed away and another gallant band assembled off the same glorious headland, at 1 A.M. of the 22nd of July, 1875. It is a magnificent precipice, rising sheer out of the sea to a height of 3300 feet. As of old, myriads of looms flew to and fro, and perched in long rows on the ledges of rock. The ships remained about two hours. Boats were lowered and 173 looms were bagged, the 'Alert' shooting 122, and the 'Discovery' 51. They would have got many more, but the sea was so rough that it was difficult both to handle the boats and to shoot straight, and many birds were lost. However, fresh meat was procured, sufficient to last for two days, for officers and men.

At 6 A.M. of July 22nd the expedition anchored off the Danish settlement of Upernivik. The Governor's wife is "Sophie," a charming Greenland lady, whose acquaintance was made, and whose pleasant smile was long remembered by the officers of former expeditions. The 'Alert' brought out for her a present of a tea-service from Sir Leopold M'Clintock.

At Upernivik, as in Disco Island, there had been a remarkably mild winter, but a hard spring. The month of June was especially cold.

Commander Markham has sent home some very ancient flint instruments, taken out of old graves near Upernivik; and Captain Feilden obtained others in the neighbourhood of Proven. Those sent by Commander Markham are five in number. The two most perfect specimens are beautifully-finished arrow-heads, the broadest part about two-thirds the whole length from the point, and thence curving inwards—one $1\frac{1}{8}$ inch by $\frac{5}{8}$ an inch, the other and most perfect specimen $\frac{7}{8}$ of an inch by $\frac{3}{8}$. They were probably used as bird darts, and are of a dark and opaque flint-like stone. The other specimens are less perfectly chipped, but are quite as interesting, from being of a transparent stone. Before the Eskimo of these parts obtained the use of iron, their arms as far back as anything is known of them, were of bone, so that there can scarcely be a doubt that these flint instruments are very ancient. The northern Eskimo tribe between Cape York and Smith Sound, used meteoric iron for knives and other weapons, and one of these knives is in the British Museum. The finding of the flint arrow-heads in the districts of Proven and Upernivik is even more interesting; and we trust that it may be the prelude to important ethnological discoveries after the threshold of the unknown region has been crossed.

The expedition remained two hours off Upernivik, and again sailed on July 22nd, at 8 A.M. The account of its most remarkable voyage through the middle pack to the Cary Islands will be found in our previous number.*

We can receive no further news until the battle has been fought and the victory won. But we can do something more than merely think of our gallant countrymen, far away in that desolate unknown region, suffering the intense hardships of an Arctic winter, and resolutely preparing to encounter far greater hardships and dangers in the spring. Those who stay at home at ease are bound to see that the absent explorers are not neglected. It is essential to their welfare, perhaps to their safety, that annual communication be kept up with them, as was done in the case of the expedition of 1852-54. While they work so hard for England in those desolate regions, the people of England are bound to see that their interests are not neglected here, and that a vessel is despatched, in 1876, to communicate with, and if need be to succour the Arctic Expedition, which will then have been more than a year unheard of, and with its fate unknown.

THE VOYAGE OF THE 'CHALLENGER.'

IX.

THE vacancy caused in the command of the expedition by the recall of Captain Nares to command the Arctic Expedition was filled by the appointment of Captain Frank Thomson, then in command of H.M.S. 'Modeste' on the China station. That Captain Thomson laboured under a disadvantage in taking the place of Captain Nares, we can well suppose; but the result of the section of the cruise of which we are now to give a *résumé*, well justifies our saying that the selection was a wise one, and that, supported as he is by gentlemen well acquainted with the peculiar duties entailed on them by the nature of the voyage the ship is on, the continuation and completion of the undertaking will be successful.

Having thoroughly refitted and completed provisions, the 'Challenger' again put to sea on the 6th of January of the present year, and at once ran into a fresh monsoon, accompanied by a heavy sea. On the 8th, in the morning, the wind having somewhat abated, a sounding of 2100 fathoms was obtained with grey ooze bottom, and as the position was one of interest, being in latitude 17° 54′ N., and longitude 117° 14′ E., near the centre of the China Sea, they were anxious to verify some thermometric observations that had been previously made; serial temperatures were therefore taken at every 50 fathoms to 400 fathoms, and every 100 fathoms to 1000. At 900 fathoms the temperature was 36°, and this temperature was maintained to the bottom. This agreed very nearly with the result obtained by Commander Chimmo, proving that the China Sea is cut off from the Antarctic basin by a submarine rampart, the top of which is between 800 and 900 fathoms beneath the

* See *Geographical Magazine* for November, p. 328.

surface. The weather remained fine as the ship pursued her voyage back towards Manila, and on the 11th she reached that bay.

The day before getting into port a small dismasted vessel was seen and bore up for. She proved to be a coasting vessel named the 'Santa Maria,' her masts had been cut away and her rudder was gone. Nothing was found on board of her but some pieces of blue jean. As the hull was found to be sound, she was taken in tow and delivered up to the Spanish authorities at Manila.

The 'Challenger' was the bearer of the news that the Spanish people had chosen another king in Don Alfonso, which intelligence created little interest and no excitement: they thought more of the changes that would take place amongst the deputed authorities than anything else; and could they, like the Vicar of Bray, retain their positions, it mattered but little to them what form of home government existed.

Leaving Manila on the evening of the 14th, the next day they passed through San Bernardino Strait, greatly admiring the rich and varied scenery on either hand, the high volcanic ridges being densely wooded to the summits, whilst lower down the patches of sugar-cane and bright green grass showed out in marked contrast. The island of Mindoro presented little sign of cultivation: it is said to abound in deer and other game, and to be inhabited by a race of Moros inimical to the Spanish rule, and considered beyond the pale of civilization.*

About noon on the 16th they passed through the narrows among the islands, and into a little enclosed sea about 70 miles long and 35 wide, extending from the north point of Tablas Island to the strait between the north-east angle of Panay and the south-west point of Masbate. It is bounded on the north-west by Tablas, the north-east by Romplon and Sabuyan, and on the south-west and south by Panay, on the south-east and east by Pulanduta point of Masbate, and the shoals and islets between Masbate and Sabuyan and between Masbate and Panay. As this seemed likely to be one of the enclosed basins presenting peculiarities in the distribution of temperature, they stopped to take serial temperature soundings and to dredge. From the depth of 150 fathoms to the bottom at 700 fathoms, the temperature was 51°·7. The temperatures generally were to a certain extent intermediate between those of the China Sea on the one side and the Sulu Sea on the other, leaving it uncertain whether the cleft in the barrier to the depth of 150 fathoms is between Tablas and Panay, or between Romplon and Sabuyan.

Passing along the island of Zebu the next morning, the scenery was very interesting, the island being well cultivated, the brilliant green of the sugar-cane patches relieving the more sombre greens of the Manila hemp-plant and the almost continuous cocoa-nut groves, whilst here and there the basket-like dwellings of the natives, built on piles, could be seen. On passing through the strait between Mactan and Zebu, they obtained a distant view of the monument erected by Isabella II. to the memory of the great navigator Magalhaens, who lost his life on the first-named island.

In the afternoon of the 18th they anchored off the town of Zebu, a thriving place, doing good business in sugar and hemp. The residents at Zebu proved more loyal than their fellows at Manila, for on receipt of the intelligence of the accession of King Alfonso to the throne of Spain, the European portion of the town was brilliantly illuminated for three successive nights. Zebu, like the others of the Philippine Islands, is not so thriving as it could be, from the lack of labour, this being a vexed question, as it is nearer home. Indeed the produce of these islands would be something enormous were there sufficient labour to develop all its resources; and as in accordance with the old proverb, "Where God does most, man does least," the actual necessaries of life growing here spontaneously, and the luxuries being obtainable for the week by one day's labour, indolence seems to be the result; and instead of endeavouring to elevate himself in position in life, all the native cares for is just to satisfy the requirements of nature, and then sleep and smoke his life away. Coal is found on the island, and, properly worked, would supply the whole of the archipelago, but the want of labour is the one great *desideratum*.

The natives, like those of Manila, are rather a handsome race, the women in particular; they have an abundance of jet-black hair, which they allow to fall loose down their backs, and this, with their brightly coloured dresses and handkerchiefs, give them a very picturesque appearance. The houses of the natives are built after the Malay fashion, on piles, and generally thatched with cocoa-nut leaves or long grass.

The good people at Zebu, amongst whom were English, Americans, and Germans, were very hospitable, the English Consul getting up a *tertulia* in honour of the strangers.

The mode of fishing for the *Euplectella* is thus described by one on board:—"One special object which we had in selecting the town of Zebu as a place of call, was to make out, if possible, something of the habits and mode of life of the beautiful sponge, the 'Venus' flower-basket,' which has of late years become so common in London, as an ornament in the form of an infinitely delicate skeleton of silica, like a horn of plenty, made of lace work of spun glass. We had seen several of the skeletons at Manila cleaned and prepared for being sent to Europe; and we were told that they all came from one spot off the island of Mactan, close to Zebu. We had no sooner landed than we saw the sponges about everywhere, and we had no difficulty in getting a couple of fisherwomen, on the following day, to consent to guide us to the spot where they were found. The Indians came to us early in the morning and we started with them in the steam-launch to the village about 6 miles off, where they lived. There we took in two very curious and ingeniously-contrived instruments with which they bring the sponges up. Two long strips of bamboo meet at an angle of 45 degrees, and are fixed in that position by an elaborate system of stays of bamboo, which are attached to a piece of wood, which runs back from the angle, between the two arms, or wings, of the machine. The piece of wood is weighted with stones, and a line is attached to it, so that the machine is pulled along on the bottom, with the angle in advance, and the two wings sloping backwards, one on either side. The outer edge of each of the bamboo rods is armed with between thirty and forty large fish-hooks, with their barbs set forwards towards the angle. The *regaderas*, as the Spaniards call them, are

* The *Times* correspondent on board the 'Challenger.'

found at a depth of about 100 fathoms. The Indian lets down the bamboo arrangement with a strong fine line of Manila hemp, and pulls it slowly over the ground; every now and then he feels a slight tug, and at the end of an hour or so he pulls it in, with usually from five to ten *regaderas* entangled on the hooks. *Euplectella* has a very different appearance, under these circumstances, from the cones of glassy net-work in the British Museum. Its silver beard is clogged with the dark gray mud in which it lives, buried to about one-third of its height, and the network of the remainder of the tube is covered with a pall of yellowish fleshy matter, which gives it a heavy look and greatly diminishes its beauty. The layer of flesh is not so thick, however, as we expected, and only slightly masks the form of even the detailed sculpture of the sponge. It is not nearly so thick and spongy as it is in another species of the same genus, which we dredged off the coast of Portugal."

From Zebu Captain Thomson decided to visit the volcanic island of Camiguin, in order to ascertain if the presence of that large and active volcano had any influence on the temperature or conditions of the water in its neighbourhood. On the 24th they left Zebu, and the following morning sighted Camiguin, which was easily distinguished by the smoke rising from the volcano. A sounding was obtained near the island, in 185 fathoms, with a bottom temperature of 57 degrees. From this it was found that the volcano did not affect the temperature of the sea. At noon a party was landed to examine the volcano, whilst the ship proceeded to the village of Agajo, off which she anchored. Camiguin is about 14 miles long by 9 broad, and at one period was a fertile and flourishing island, with a population of about 25,000; it is now reduced to a few hundreds. The principal town, Catarman, was entirely destroyed by the volcano that sprung up so close to it; the lava is now hiding the site. After the first eruption of this last volcano, the earthquakes, which had before been frequent, ceased, and since then the mountain has gradually and steadily increased in size. At the end of the first four months, it was about a third of a mile in diameter, and about 400 feet high. It is now, after an interval of four years, nearly 2000 feet high, and descends with a steep angle to the sea. Leaving the same evening, they anchored at Samboanga on the morning of the 29th. The day before reaching this port a sounding was obtained in 2225 fathoms, and serial temperatures obtained to 400 fathoms. Having completed coal at Malinipa Island, they returned to Samboanga, and took on board a stock of pigs and goats for Greenwich Island, and then passing out through Basilan Strait, proceeded on their voyage. On the 8th, in lat. 5° 47′ N., long 124° 1′ E., a sounding was obtained in 2050 fathoms, red clay bottom: the serial temperature produced the same results as had been previously obtained in the Celebes Sea. After passing through Sarangani Strait, a course was steered for Mata Island; but although only 6 miles from its assigned position, it was not seen. On the following morning Meangis Islands were seen. Whilst dredging off the islands, a large canoe came out, showing a Dutch flag. The canoe was 30 feet long, and contained twenty-two men, who were of a dark brown colour, and had their hair tied up in a knot at the back of the head. Paroquets and mats were exchanged for tobacco.

On the 12th a sounding was had in 2550 fathoms, with a bottom temperature of 34°·6; on dredging, the dredge and a large quantity of line was nearly lost, and when it came to the surface, it was found to contain some stones and *one* shrimp. On the 21st, sail was shortened, and Humboldt Bay, New Guinea, steered for. A quantity of driftwood was passed through. On the 22nd a sounding in 2000 fathoms was obtained, in lat. 0° 39′ S., long. 138′ 55″ E., then 75 miles from the shore of New Guinea. Serial temperatures were taken to 1500 fathoms, the bottom temperature being 34°.4 that being the temperature from the depth of 1300 fathoms. The following day at noon the high land of New Guinea was made, and at seven in the evening, after passing between Point Caillié and Cape Bonpland—two rocky bluffs forming the entrance to Humboldt Bay, so named by Captain D'Urville who visited this part of New Guinea in the 'Astrolabe,' in 1827—they anchored soon after in 18 fathoms.

The natives no doubt were greatly surprised at a stranger thus dropping so suddenly among them. They showed lights in different places along the beach; in one place they were so regular in regard to their distance from one another, that it was difficult to conceive that it was not a row of street lamps. Several canoes paddled off to the ship, but would not venture alongside: they lay a little way off, their occupants keeping up a continued chaunting noise and howling throughout the night, which, to those who were courting sleep, was anything but agreeable.

On the 24th they shifted berth, and after steaming about for some time anchored in 36 fathoms near Point Caillié. This anchorage was named "Challenger anchorage." Mount Cyclops, a high serrated ridge, rising 6000 feet above the sea, formed a magnificent background on the one hand, whilst Mount Bougainville, 4000 feet high, did the same on the other.

At daybreak the ship was surrounded by nearly a hundred canoes, each manned by from three to six undoubted and unadulterated savages, armed with bows and arrows, spears and stone hatchets, the latter guiltless of the manipulation of "Stone Jack." On lifting the anchor to shift berth, the first turn of the screw created the greatest consternation amongst the natives, those nearest to the disturbed waters springing to their feet and levelling their arrows, as if they expected an enemy to rise up. As the ship steamed slowly up the bay the canoes did their best to keep pace with it. The scene at this time is described as being peculiarly interesting, the beautiful natural wild scenery of the shore with its hills covered to the water's edge with magnificent trees and foliage, whilst around them a moving mass of swarthy figures, many decked gaily with birds' feathers or leaves and flowers, in all the glory of war-paint, and all joining in a monotonous chaunt in unison with the sound of the conch-shells, which gave the key-note, accompanied the ship. It was observed that the men dressed their hair in two distinct ways, probably serving as a distinction of caste or age; the greater number had their hair frizzled, in appearance like a large turban, about 12 to 18 inches in diameter; these had their heads ornamented with feathers, flowers, &c., the others, and decidedly younger men, had their hair cropped close all round, excepting a ridge about 1½ inch long, extending from the forehead to the back of the neck,

With regard to their attire, much cannot be said, for although some few had a small cloth wrapped round the loins, the generality were *in puris naturalibus;* they, however, wore several ornaments, in armlets of shells, necklaces of teeth, and breastplates of boars' teeth arranged symmetrically. Some had boars' tusks joined and thrust through the bridge of the nose, extending from ear to ear, and curved up or down as a moustache, according to the fancy of the wearer. The ornamentation by tattooing was slight, but the colouring of the face by pigments was singular and fanciful. Many were pitted with small-pox, and some had skin disease. They remained alongside the ship the whole day without food, and carried on a brisk commerce, exchanging their bows and arrows, spears, necklaces, and stone implements of various kinds, for hoop-iron, coloured prints, and handkerchiefs: but nothing would tempt them to leave their canoes. The villages had some of the houses on the land among the trees, but the generality were erected on platforms raised on piles a few feet above the sea, the platform communicating with the shore by planks, which answered the purpose of a drawbridge on being withdrawn. The huts are conical, rising to an acute angle at the top, the whole being supported by a central post from which the others radiate. An attempt was made to land, but in some places the attitude of the natives were so unmistakably hostile, that to prevent a rupture it was considered best not to persevere, and the boats were recalled. One boat did land and was well received; and it was evident that time would soon have established friendly relations, but that indispensable requisite was not at the command of the 'Challenger's' captain. From his gentleness and forbearance, however, there can be no doubt he has left a friendly feeling behind, which will be to the advantage of the next ship that visits Humboldt Bay. But few women were seen, and none came off in the canoes to the ship. They were foremost on the land to prevent landing, bringing the bows and arrows from the huts. The matrons were attired in a short kilt, but the younger women and girls were entirely naked.

That there is a great future for this vast island, there can be no doubt, situated as it is so near our own colonies in Australia, and capable of producing so much; for that this country, with its accessible sea coast, should remain unproductive, as far as the great family of mankind is concerned, and entirely closed to commerce, is an anomaly in this 19th century that cannot be well understood. Already the restless spirits of some of our Australian prospecting fellow-subjects are being stirred with the desire to be more intimately acquainted with the *terra mystica* so near them and yet so far off: annexation is spoken of openly, and meetings have been held for the furtherance of that object. We can well imagine what the effect of private enterprise would be to break the spell with such a warlike race; blood would soon be shed, and then a war of robbery, spoil, injustice, and extermination would commence, with the inevitable consequence to the savage of being improved away. Whether in the face of this contingency imperial necessity, in regard to the welfare of our great colonies in Australia, would warrant establishing ports of annexation round the coast, to prevent other nations establishing colonies or strongholds so near our possessions, is a question that in the course of time must be faced; or whether our colonies will take the initiative in equipping expeditions, either private or public, for the same purpose; but either one or the other seems to be one of the great questions of the day—the colonies for self-preservation, or the Government for the preservation of the colonies. We cannot hope or expect to make the savage appreciate our necessity, and our great object should therefore be to bring about what must be considered inevitable, with as much protection and as little injustice to the savage as possible; and this can only be done by a great country like ours taking the initiative, and restraining depredators and prospectors by the strong arm of the law.

Finding that more information could not be obtained without the chance of rupture with the natives, the very forbearance being probably misunderstood, the 'Challenger' sailed the same evening (the 24th), and proceeded on her way to the eastward along the north coast of New Guinea. On the 1st of March soundings were obtained in 1070 fathoms, red and grey mud, the bottom temperature being 35°7. On the following day they passed Hermit Island. On the 28th one of the Schouten Islands was seen, and on the 3rd of March they arrived at Admiralty Island. They could not make out the land in consequence of the misty rain, but in the afternoon the weather somewhat cleared and they found themselves at the entrance of a bay on the north-west coast of the island, which they entered, and anchored in. This bay was afterwards carefully surveyed, and named Nares' Bay, after the late captain. As the ship approached the land, several canoes with natives came off eager to trade. The canoes were very superior, and 30 to 40 feet long, being double the size of those seen in Humboldt Bay, with crews of from ten to sixteen natives in each. The body of the canoe is carved out of a single tree, and is symmetrical in form. The natives are a well-made set of men, averaging about 5 feet 7 inches in height, and rather muscular. The women are much smaller than the men, and decidedly inferior in every respect: the colour of the skin is dark brown, and many of them were tattoed, and had circular marks at intervals over the body, which appeared as if they had been burnt in. They have nothing of the appearance of the negro, their noses being well formed and prominent; but the teeth in all are in a state of rapid decay from the universal and constant chewing of the betel-nut. They were certainly more clothed them the Papuans, the majority appearing with a cloth round their loins, and all had a bag containing a knife suspended round the neck, and hid under the armpit. The hair is black and frizzled: it is sometimes tied in a knot at the top of the head by a band of tapa, having the appearance of a *chignon.* An ornament, consisting of a disc of mother-o'-pearl, overlaid with a thin layer of carved tortoiseshell, is worn in front of this topknot. Their arms consisted of light spears, 6 to 7 feet long, with heavy heads of obsidian: these they throw with great force and accuracy. In addition, they have the knives before mentioned, which are made of the same material as the spear heads, and are long and sharp.

The natives carried on a brisk trade, exchanging tortoise and pearl shell, spears, knives, hatchets, necklaces of teeth, &c., for old iron-hoop, hatchets, hand-

kerchiefs, &c. Some of the men ventured on board, but they were timid. No opposition was made to landing. They endeavoured to keep the strangers away from the villages and kept the women out of sight, but the curiosity of the sex is the same all the world over, and they soon came out in little groups to gaze at the white men: their appearance, however, was not considered pleasing. They were generally tall and gaunt, with long pendulous breasts, and their mouths entirely ruined by chewing betel-nut. Their clothing consisted of two deep fringes of palm-leaves, depending from the waist before and behind. The houses were somewhat like those of the Papuans, being of a bee-hive shape, supported by a central post: the floor is arranged with sleeping mats, the outer circle being for the young men, and the inner for women and married couples. Their cooking and other utensils were well designed and even elegant in shape, and frequently carved in elaborate patterns. The village is surrounded by a palisade of logs about 5 feet high. The natives took a party of the officers to an island where they indicated some pigeons were to be had. As they neared the island a deep cooing sound was heard, and clouds of birds rose from the trees. On landing the noise was almost deafening, and the place was swarming with large nutmeg pigeons. The shooting could scarcely be called pigeon-shooting, it was more a case of pigeon-butchery, but they did not prove so good for the table as they looked, the flesh being dry and without flavour. Endeavours were made to ascertain how they disposed of their dead, as no graves could be traced; and it is greatly to be feared—if our voyagers rightly understood the pantomimic explanation of the natives—that they disposed of their dead by feeding the living, in other words, they boil and eat them, and they very emphatically explained to the enquirers that they would be very happy to eat them if they had the opportunity. As large numbers of human bones were found in pots, mixed with those of the lower animals, it can scarcely be doubted that their explanation was too well understood. Altogether, the natives of Admiralty Island stood in fair contrast with their fellow savages of Humboldt Bay; they were certainly more honest and friendly, and after a little time allowed the strangers to walk about anywhere without hindrance; but the greatest care was taken not to intrude or in any way offend them.

On the 10th of March the 'Challenger' steamed out of Nares' Harbour. It was Captain Thomson's intention to visit Hogolu in the Caroline Islands, but he gave up the intention, hoping to fetch Gaum, one of the Ladrones', but the prevailing north-easterly wind and westerly current, from the second day after quitting Nares Harbour, carried the ship to the westward of both groups without even sighting one of the islands. The course from thence to Japan was practically on the meridian, or nearly north and south, there being but little difference of longitude. In the sea between Papua and the stream of islands forming the Caroline Group, depths were found from 2650 fathoms to 2325, principally with the red clay bottom; but those islands passed, the deepest sounding of the voyage was had, and it may be added the deepest authentic sounding ever taken, for although a somewhat deeper sounding is reported to have been taken in the United States vessel 'Tuscarora' off the east coast of Japan, it lacked the corroborative evidence of a bottom specimen, and we are glad to record that this sounding of the 'Challenger' is placed beyond a doubt by it being repeated with nearly the same results, the first giving 4575 fathoms, and the other 4475. This remarkable sounding was obtained in latitude 11° 23′ N., longitude 143° 16′ E., or nearly midway between the most southward of the Ladrone Islands and the north-easternmost of the Pelew Group. The first sounding was taken in the morning, and only a small specimen of the bottom being brought up, and also from the extraordinary depth found, it was decided to repeat the operation, the ship having drifted a little in the meantime. Three out of four of the Miller thermometers succumbed to the enormous pressure they had to bear—between five or six tons to the square inch. As a proof of the perpendicularity with which the sinkers descended, particles of the mercury from the broken thermometers were found imbedded in the red clay brought up on the tube. The remaining thermometer registered a temperature (corrected for pressure) of 34°.5, so that at that spot there is a layer of water of that uniform temperature for 3075 fathoms. 200 miles north of this position the water had shoaled to 2300 fathoms and it continued at nearly that depth (increasing only 200 fathoms) to within 150 miles of Japan. The trawling operations on this last section of the voyage were not very successful, the great depth of water and the nature of the bottom not being favourable for the purpose.

The expedition reached Yokohama on the 11th of April.

J. E. DAVIS.

N. P. BARBOT DE MARNY'S GEOLOGICAL EXPLORATIONS IN THE REGION OF THE AMÚ DÀRYA.

(Read at a Meeting of the Russian Geographical Society, March 5th, 1875.)*

IN the course of last summer I made a geological journey from the Fort Alexandrovski on the Caspian to the foot of the Thian-shan. The expenses of this expedition, which extended over six months, were borne by the Society of Natural History of the St. Petersburg University and by the Russian Geographical Society. A full report of my researches can be made only after the vast materials collected by me shall have been sifted, and my hypsometrical observations computed, but I hasten to place the Society in possession of the general results obtained.

Our first geological information respecting the district of the Amú Darya is due to Basiner, who, in 1842, accompanied the embassy of Colonel Danilevski. His observations were of a fragmentary nature. Amongst other specimens he brought back with him a few rocks from the Sheikh Jeili Hills, which Helmersen determined to be varieties of diorite and quartz. The officers attached to the expeditionary force of 1873 likewise collected a few fossils and rock specimens along the right bank of the Amú, between Uch-Uchak and Meshekli, and these proved that the cretaceous formation existed there.

* Isvyestya, xi., Part II. 1875.

I now turn to my own explorations. About the middle of June my travelling companions, MM. Bogdanof and Butler and myself reached the western shore of Lake Aral, where a schooner awaited us, and brought us to the mouth of the Amú, where we were transferred to the steamer 'Samarkand,' which had just arrived from Kazalinsk. When within 1¾ mile of the Kichkine-Darya mouth of the Amú, we observed that the grey water of the river took the place of the pea-green water of the lake. The delta presented itself as a green carpet of unbounded extent. It was covered with cane, attaining a height of 21 feet. Having ascended the Kichkine-Darya for some distance, we met with dry land, consisting of grey muddy clay, covered with cane. On reaching the Ulkun-Darya the river widens occasionally, and forms the lakes Kara-kul, Sary-kul and others, and auls of Kara-kalpaks make their appearance. Having ascended about 52 miles, we reached the Kashkana Tau, an isolated hill, attaining a height of about 300 feet. Here we left the steamer. This hill has a flat top. Its western slope is steep, and forms two terraces, the upper consisting of greyish-yellow sand, containing concretions of gypsum, the lower of greyish-green sandy loam. The lower of these terraces terminates in peculiar cap-shaped hillocks, some of which are quite isolated. These are generally ascribed to the action of the waves of an ocean, which travellers imagine to have existed here, but they are evidently due to atmospheric erosion, the progressive action of which can be traced on the spot. The strata of this hill dip slightly towards the north-east; they contain no fossil, and mineralogically they remind one of the north-western coast of Lake Aral.

From Kashkana Tau to Chimbai (29 miles) we travelled by land. The country is altogether barren, and the eye meets nothing but grey clay, covered now and then with saxaul shrubs. The latter appear frequently sunk below the general surface of the country. This arises from the fact of sand underlying impermeable clay. As soon as the roots reach the former the water begins its erosive action, hollows are formed, and entire shrubs sink into them. On approaching Chimbai the country becomes more animated. There are canals, fringed by gardens and woods.

Chimbai, a small trading town, lies on the river Kegeili, which we navigated in Kayiks as far as Nukus (46 miles). The banks still consist of grey clay, covered with dense canes, saxaul and thorns. On entering the Kuvanj-Jarma the clay banks visibly increase in height. At length we entered the Amú Darya itself, and were astounded at its volume and rapid current, which reminded us of the Mississippi. Nukus lies at a distance of a few miles from the Amú, on a channel which connects that river with the Kuvanj-Darya. It occupies almost the apex of the delta, which is formed of grey, tenacious clay, above which rise a few isolated hills, mostly consisting of the same material. These are the remains of dry land, which has been washed away by the river. From Nukus we travelled up the right bank of the Amú as far as Petro-Alexandrovsk, a distance of 104 miles. Close to the river we still met with clay, but on leaving it we at once entered a region of sand-hills, where limestone strata containing fossils of cretaceous age were occasionally exposed. The sand in many places forms ridges, locally termed "Barkhan." Further on the country rises gradually, and isolated mountains make their appearance. The Besh-Tau constituted a marked feature. It contains many fossils, including ammonites. The *Chalpyk* Mountain rises higher than any other hills in its vicinity. It has two summits, consisting of sand capped by black ferruginous sandstone, which has protected it against erosion. The Chalpyk affords a capital view of the Sheikh Jeili Mountains, which differ from it in their contours, and evidently consisted of crystalline rocks. These mountains lie beyond the lake Khaji-kul, which communicates by a channel with the Amú. We travelled along the northern shore of this lake, where we found chalk. I observed soft sandstones passing into a loose conglomerate, which has partly been worn into *débris*. The chalk-strata on the western slope of the Sheikh Jeili have a dip of 30 degrees.

We crossed the Sheikh Jeili, and returned to the valley of the Amú, along which we continued as far as the town of Bi-Bazar. The country thence as far as Shakh Abbas Wali is the best cultivated within the newly-acquired territory, and there are numerous irrigation canals, with plantations and gardens.

From Shakh Abbas Wali to Petro-Alexandrovsk our road led through a sandy steppe. I extended my researches as far as the frontier of Bokhara, about 40 miles higher up. Our road at first led along the valley of the river, where we saw nothing but clay and cane. But on leaving the valley, hills were met with, particularly near Basargan. Calcareous sandstones, with fossils of cretaceous age, were frequent, and near Basargan they formed the banks of the Amú, which are steep and elevated there. Elsewhere terraces were observed. At Mesherkli, on the frontier, many fossils were likewise met with.

From Mesherkli, 270 geographical miles above the Amú mouth, I returned to Petro-Alexandrovsk, whence I made several excursions into the Sheikh Jeili Mountains. I went for that purpose to Shakh Abbas Wali and Kalendar Khan, which are both on canals, but likewise obtain some water from wells, which are bored through the clay until they reach the sand.

The Sheikh Jeili, as seen from Kalendar Khan, presents an undulating contour, above which rise a few prominent summits, the highest of which is called Kargan Tau. This was the goal of my first excursion. On the road a dry arm of the Amú-Darya is crossed: it is said to extend from above Petro-Alexandrovsk to Shurakhan, and we found fresh-water shells in it. In the transverse valleys of the Sheikh Jeili we met with slates and gneiss, and occasionally crystalline limestone. Further on, we found chlorite, talc, and hornblende schists. The schists frequently contain small crystals of magnesite spar and pyrites, and are traversed by veins of quartz. Copperas occurs in quantities too small to repay working it. There are traces of former mining operations, especially in the talc-schists, but I found not a single trace of ore, and in spite of a report that gold and silver were formerly obtained in these hills, I am of opinion that the search for minerals, though probably repeated frequently in the course of centuries, was never rewarded by discovering the sought for riches. Our return led us through the Sultan-Waiss (Kieperts' Sultan Uweis Tau) Mountain, which consists of layers of white marble, and in which there is an

excellent spring; strange to say, almost the only one known throughout the region of the Sheikh Jeili. The Sheikh Jeili is altogether barren, and there are neither shrubs nor herbs.

My second excursion was directed to the eastern portion of the Sheikh Jeili. I again crossed the old channel of the Amú, the left bank of which consisted of chalk, which takes the place here of the clay of the Amú and its delta. On approaching the mountains we observed that the hills at their foot were black capped with white. This is due to irruptions of quartz. On ascending the mountains by the road leading to Korjui we found that they consisted of several parallel chains. The first of these consists of black gneiss; the second of reddish marbles, the others of chlorite and talc-schists. On the return journey our attention was attracted to a large mass of white rocks, which turned out to be protogine, and contained almandines and beryls. The specimens found by us were inferior, but more valuable ones may possibly be discovered.

Our third excursion was made along the Daukara road, which crosses the more westerly Kazgan Tau. We met there with the same rocks, but the strike and dip differed. Sometimes the strata were perfectly vertical. When I reached the water-parting I found that it consisted of sedimentary rocks, and the schists were overlaid by sandstone of a dirty yellowish colour. The water-parting is perfectly level, and offers a fine prospect. The southern slope is exceedingly steep, whilst the northern descends gently to the Kyzyl Kum desert. Towards the west the Sheikh Jeili assumes a north-westerly direction, and likewise merges into the desert.

A fourth excursion was made to the western termination of the Sheikh Jeili, where two offshoots from it approach close to the Amú. They consist both of chlorite schist and marble. On the southern offshoot we discovered the remarkable ruins of the fortress Yampak Kala.

The depression between these offshoots is filled with chalk, horizontally bedded, and abounding in fossils. The northern offshoot approaches close to the Amú at Kasnak, and the Yur-tau, on the left bank of that river, is said to be a continuation of it. The Amú, cannot, however, be said to break through the Sheikh Jeili, which terminates close to it, and the hills on its left bank can be looked upon merely as outliers. The river itself excavated its bed in the chalk.

The general results of these excursions may be said to be as follows:—The whole of the country to the north of the Amú is covered with chalk. The Sheikh Jeili, a mountain mass, 35 miles in length, and consisting of crystalline rocks, gneiss and granite, rises above the chalk. It is the result of successive upheavals, and existed already when the whole of the surrounding country was covered by the ocean, in which the chalk was deposited. The entire valley of the Amú and its delta are covered with grey clay. The only useful minerals observed by us were marble and other building stones. The traces of copperas do not invite further search. There are phosphatic nodules in the chalk, and precious stones in the Sheikh Jeili, but the most useful mineral of all is the clay. The natives build all their houses with it, and its impermeability alone renders irrigation possible. The oasis of Khiva would not exist without it, and all organic life is confined to the banks of the canals.

After these explorations I made a journey into the desert of Kyzyl Kum, and penetrated as far as Samarkand. Our first geological knowledge of this desert is due to MM. Pander and Eversmann, who accompanied Negri's embassy to Bokhara in 1820. Lehmann, a member of Colonel Butenyef's mission, added little to the information collected by his predecessors. We learn from these travellers that the desert contains clayey soil, sand, and salt-swamps, and that many mountains rise in it, of which the Bukan Tau is the most considerable, and consists of crystalline rocks.

During my excursions on the Amú I had been accompanied by a detachment of Cossacks, but they were able to attend me only as far as Myn-bulak (90 miles N.E. of Meshekli). Thanks, however, to the foresight of Colonel Ivanof, the chief of the Amú district, I and the officer of Cossacks, Grekof, who accompanied me, were placed in charge of two influential Kirghiz, who accompanied us as far as Tamdy, where we were met by men sent from Samarkand to meet us.

From Petro-Alexandrovsk we went to Shurakhan. Beyond that place the elevation of the country and the sand increase, until at length we found ourselves in the midst of a sea of sand. We noticed, however, that the sand overlies solid rocks, which form ridges, generally running north and south. *Débris* is frequently found at the foot of these ridges, and ferruginous calcareous sandstones are occasionally exposed on the surface. Now and then we met with salt swamps, the salt being probably derived from the chalk, and salt efflorescences being actually discovered by us upon sandstones.

Our road led over ridge after ridge to the Kara Choku Mountain, which consists of yellow sand capped with ferruginous sandstone. Further on the sandhills much obstructed our progress. We reached the Sandyk Tau, the summits of which are covered with layers of calcareous sandstones, containing fossils of cretaceous age. At Myn-bulak we found a spring of excellent water, a more welcome occurence as most of the wells of the steppes are slightly brackish. Along the whole of the route, as far as Myn-bulak, I observed large numbers of sand-hillocks covered with saxual and thorn. These shrubs may be looked upon as the preservers of these hillocks, for the loose sand all around them is drifted about at the mercy of the wind, that of which they consist is kept together by the shrubs growing upon them. In the steppes the wind is one of the most important geological agents, destructive as well as productive, and what is done elsewhere by water is effected here by the wind. Occasionally large tracts are covered with hillocks of the kind described, and there is no doubt that the sand of which they consist has been drifted long distances.

The Bukan Tau rose in the north as we approached Myn-bulak. This name, however, is not applied by the natives to the whole of these mountains, for they have special names for every part of them, such as Tobi-bergen Tau, Yirlir Tau, Ui Tau, &c. The main direction of the chain is north and south; the Tobi-bergen Tau branches off towards the south-west. We reached the Bukan Tau at the spring of Kuldur. It is composed there of strata of crystalline limestone,

striking nearly west and east, and having a dip towards the east. The limestone rests upon clay-slate and is covered uncomformably by strata of conglomerate.

The barren summit of the Yirlir rises to the east of Kuldur. It consists of limestone strata, much contorted, and its sides are strongly ribbed. Near the Yirlir we came upon the caravan-road leading from Bokhara to Kazalinsk. In the course of our further march into the Bukan Tau the crystalline limestone was replaced quickly by grey clay-slates and granite. Within the area of the latter we came upon the torrent Bakali, and immediately afterwards we found ourselves in a wild mountain gorge, surrounded by high granitic rocks traversed by veins of black porphyry. On entering the steppe from this gorge, we perceive at once that sedimentary rocks occupy a portion of the lower slopes of the mountain. We journeyed towards the south-east, along the foot of the hills, and at the opening of each transverse valley we met with Kirghiz Auls. The Ui Bukan consists of granite, but on approaching Yuz-Khuduk the mountains appeared to be formed mainly of clay-slates, and there were large masses of quartz.

Beyond Yuz-Khuduk we soon lost sight of the Bukan Tau, but the steppe was elevated, and clay-slates frequently protruded on its surface. The Altyn Tau appeared towards the south, the Bas-Tau towards the north. Their geological structure might be guessed at from the *débris* met with along our path, which consisted of black and white quartzite. Now and then we met with cup-shaped depressions or basins, as for instance near Besh-bulak, where fossiliferous sandstone cropped out on the surface. Altyn and Bas Tau gradually sunk below the horizon, and we approached the Tamdy-Tau, at the foot of which lies the camp of Dos, the principal Kirghiz chief. The Kyzyl Kum Kirghiz number about 1600 Kibitkas, and nomadize during summer near the springs in the mountains, during winter in the steppes, where they find saxaul. Nature hardly affords them anything. They neither keep horses nor cows, but only camels and a few sheep. They purchase their bread and linen, procuring the money required for that purpose by acting as carriers between Bokhara and Kazalinsk. Their only manufactures are felt, camlot, and ropes. The settlement at the Tamdy consists merely of two or three huts, near which grow a few water and sugar melons. The Tamdy Mountains consist of crystalline limestone, having a north-westerly strike; they have well-defined contours, and are exceedingly steep, which prevented my ascending one of their summits.

At Tamdy we turned towards the south-east, and soon reached the Murun-Tau, which consists of crystalline limestone likewise. We journeyed along its foot. Other mountains rose in the south-east, the western portion of which is known as Aristan Bel Tau, and beyond their eastern extremity the sharp contours of the Kazak Bai Bek Tau made their appearance. These latter consist of limestone, clay-slates and quartzite. On our proceeding further towards the south-east the mountains were less defined in shape, but the steppe itself became hilly, and slates were exposed in places. Beyond the Mas-chi well we at length beheld the Nurata Mountains, still about 60 miles distant.

We travelled straight towards them after we had reached the Balta Saldyr wells. Our direction was south. The Nurata consists of two parallel chains; their summits were covered with snow. One of the two chains is known as the Ak Tau. It extends from north-west to south-east, and partly lies within the frontiers of Bokhara, whilst the more northerly chain, the Kara Tau, is entirely within Russian territory. The outer buttresses of these mountains consist of black crystalline limestones. They are succeeded by black micaceous clay-slates and black quartz-schists, striking towards the north-west. Then came grey gneiss, and finally granite. In ascending the mountains we followed a transverse valley near a place called Temir Kabuk. They rapidly assumed an alpine character, barren rocks and mountain torrents abounding. The granite soon became the predominating rock, and the whole of the central mass of these mountains consists of it. On reaching the water-parting we found that perennial snow likewise existed towards the east, and that the southern slope was covered with vegetation, and there were fields and gardens along the mountain streams. The northern was altogether barren.

We left the summit and descended into a longitudinal valley separating the central chain from the Ustyug Tau. Our path led over clay-slate. In the valley we found a village (Kishlak) Akchap, in the midst of gardens, abounding in walnut, sandalwood and other trees. The Ustyug Tau consists of clay-slate, and there are masses of conglomerate, horizontally bedded on its southern slope. Having descended the Ustyug Tau, we continued our journey through Bokharese territory, following either the valleys or crossing clay-slate hills. On reaching the summit of the Chirlak we at length caught sight of the valley of the Zarafshan, the dark foliage of the trees fringing the rivers forming a striking contrast with the bright green of the plain. The centre of the valley was enveloped in fog, beyond which rose the contours of the Sarabiz Tau. The valley of the Zarafshan, like that of the Amú, consists of grey loam, and there are numerous cap-shaped hillocks of yellow sandy clay or loess, which have escaped destruction from the floods. Most of these hillocks are surrounded by villages, to whose inhabitants they afford a place of safety in case of inundations. Near the town of Chilek we already found ourselves in the most fertile portion of the valley. Canals of irrigation abounded: there were rice and cotton fields, and a dense population.

We crossed the Zarafshan and several of its branches beyond Daul. Samarkand, with its gardens, occupies a hill consisting of loess, and which is joined in the north to another hill, the Tapana Tau, which consists of clay-slate and micaceous sandstone, striking north-west. Layers of green marl with gypsum are bedded unconformably upon these, and still higher up we met with horizontal beds of conglomerate. The crystalline rocks of the Chapana Tau are thus identical with those of the Kara Tau, and the marls and the gypsum are probably of cretaceous age.

The distance from Petro Alexandrovsk *viâ* the Bukan Tau and Tamdy, to Samarkand, is usually assumed to be 400 miles. The results of my journey may be summarised as follows:—

1. We met marine formation along the whole of the route travelled by us, which proves that the Aralo-Caspian at one time extended to the foot of the Thian-shan. 2. There are many isolated mountain ranges in

the Kyzyl Kum, which resemble the Sheikh Jeili and the Nurata Mountains geologically. Their stratigraphical relations are likewise similar, for their strike is generally N.W., varying between W. 15° N. and W. 45° N. We are therefore justified in assuming that the mountains in the steppe form part of the system of upheaval of the Thian-shan. 3. With respect to the origin of the Barkhans or sand-hills, I frequently heard it asserted that they partook of the nature of dunes, and marked the shore of an ancient ocean, which at one time covered the steppes. I found, however, that the material of which they consist may be derived from any geological formation, as long as the sand is not sheltered against the action of the wind. The steppes visited by me are most favourable to the formation of "barkhans," as the prevailing rocks consist largely of sand and soft sandstones. As no vegetation springs up on the latter, owing to climatic and other conditions, they are exposed to the action of the wind. 4. The salt-swamps met with in the desert do not derive their salt from recent marine deposits, which are not met with at all, but from the efflorescence of cretaceous strata.

After a journey of something like 1400 miles on horseback, I found much-needed rest in the city of Samarkand. This certainly is one of the most remarkable places in Central Asia, to the archæologist and historian not only, but likewise to the geologist. I took great interest in examining the building materials employed in the ornamentation of the interior of the houses, and particularly of Tamarlane's tomb. Various kinds of marbles and limestones have been used. A dark-green stone on Tamerlane's tomb, which is mentioned by all travellers, I discovered to be nephrite or Oriental jade.

I feel conscious that this report of my explorations suffers from monotony. But you should bear in mind the almost unvarying uniformity of the desert, where one day seems like the other. Even the scanty results which I am able to submit to you have been obtained at the cost of much labour and many privations.

THE BASIN OF THE MACKENZIE RIVER.

WE have before referred to the explorations conducted by the Abbé Petitot for a continuous period of eleven years, in the basin of the Mackenzie River, in Arctic North America. The long and interesting paper read by him before the Paris Geographical Society, is spread over three of the monthly *Bulletins* published by that body, and we have here reproduced some of the chief points of interest touched upon by M. Petitot. He commences by tracing the route of the traveller from Fort Garry (the outpost of civilization as far as comfortable travelling is concerned) to Lake Athabasca and thence to Fort Good Hope, on the Mackenzie, a most tedious journey, which, from St. Boniface, takes altogether four and a half months—from May to September. Lake Athabasca he describes as apparently resting on a granite formation, and hemmed in on the north and east sides by granite rocks, about 500 or 600 feet in height. It is studded with numerous islets, which bristle with pine-trees, and gives one at a distance the idea of a forest of masts. The climate is milder than that of the Mackenzie, the valley of the Peace River being more especially known for its great fertility, the excellence and abundance of its timber, and its mineral wealth, which comprises coal, asphalte, sulphur, gypsum, iron and even gold. The granite formations cease on reaching the rapids of the Slave River (the outlet of Lake Athabasca), and farther north lie to the east of a line which, speaking roughly, may be said to run parallel to the Mackenzie, from the mouth of the Salt River to the N.E. angle of the Great Bear Lake. The intermediate region between this line and the Rocky Mountains is occupied by secondary and tertiary formations. The Athabasca and Slave Rivers bring down a considerable amount of *detritus*, which is gradually turning the estuary of the Mackenzie into a huge swamp. The waters of the Great Slave Lake are charged with lime and vegetable matter, and bring down enormous quantities of drift-wood and uprooted trees. In describing the topography of this noble lake the Abbé points out that Lake Aylmer, which drains into the Great Slave Lake, is so close to Lake Sussex, the source of the Great Fish River,* which flows in the opposite direction into the Arctic Sea, that on many maps the two are joined, and the Great Slave Lake is thus represented as possessing the anomaly of a double outlet. This is incorrect, as may be seen by a reference to Sir G. Back's narrative. One of the most important of the present stations in this region is Fort Rae, situated about a day's journey east of the Yellow-Knife River, in 62° 28′ N. lat. and 115° 29′ W. long. The sandy soil here prevalent is wholly destitute of vegetation, and wood itself is very scarce. The Great Slave Lake is rich in salmon, trout, carp, perch, and other fish, while the banks and inlets are frequented by a large quantity of aquatic game, such as the trumpeter swan, the Arctic duck, &c. The reindeer and musk-ox are also plentiful.

Regarding the Mackenzie, Père Petitot estimates its total length as 2500 geographical miles, and its basin as embracing an area of about 443,000 square miles. The plain through which the river flows is about 400 feet above its level, and the beds which it has successively hollowed out for itself are marked by terraces of former banks. There are only five or six rapids, and these are occasioned by spurs jutting out from the main chain of the Rocky Mountains in a N.N.E. direction. There are eleven trading stations in the Mackenzie district, eight residences of French and one of English missionaries, the Athabasca district having eight trading and four missionary stations. The vegetation along the banks of the Mackenzie is poor; lichens and moss take the place of turf. The white fir, birch, alder, the aspen, and willow are the trees which chiefly abound: to the east is found the steppe-fir, a poor tree, which ranges between 20 and 6 feet in height. The Bank pine, which the Canadians call cypress, does not extend further than the 63rd parallel; the poplar, than the outlet of Great Bear Lake, beyond which it can scarcely be called a tree; the birch and fir cease at the 68° 30′ parallel, but willows fringe the delta of the Mackenzie and the banks of the Peel River. The steppes are bare of all vegetation except lichens, Labrador tea and the *Andromeda tetragona*, a plant which, in a country where fuel

*The name of this stream ought really to be Whale River, that being the "great fish" which, by its presence in the estuary, has lent its name to the river itself.

is so scarce, is worth its weight in gold, as its leaves burn equally well green, dry or saturated with moisture. It is, however, confined to the margin of the Mackenzie and the slopes of the Rocky Mountains.

The Abbé is distinctly of opinion that, whatever may be said to the contrary by enthusiasts, the region of the Mackenzie can never be colonized. Culturable ground is only to be found alongside of the Liard River, and in a few islands, such as that on which Fort Simpson is situated, where potatoes, vegetables, and cereals grow, and even wheat ripens in favourable seasons.

The Great Bear Lake is larger than the Great Slave Lake, and consists of five large gulfs or recesses. From October to the middle of July it is covered with ice, varying between 7 and 10 feet in thickness; in its exposed situation it is swept by the most violent snow-storms, called *Kamatsan*, which often wholly bury its sole trading station, Fort Franklin. Although one of the dreariest regions on the face of the earth (the district of Anderson River alone excepted), it is frequented by large quantities of reindeer, while the waters of the lake yield excellent salmon, weighing sometimes as much as 32 kilograms, and herrings (*Clupea harrengus*) in great numbers. The lake is fed by 36 streams, and it has one outlet, the Telini-die, or Great Bear River, issuing from Keith Bay. The temperature is lower than that of the Mackenzie district, but still not so low as that experienced by Père Petitot near Fort Anderson, where, in March 1865, he camped out with the thermometer (Fahrenheit) at 62° and 65° below zero, or, in other words, 94 and 97 degrees of frost.

North of Great Bear Lake rise three rivers of some importance, which are new to our existing maps; these the Abbé has named Macfarlane, Anderson, and La Ronciére, the first two being supposed by the Indians to be fed by subterranean emissaries from some small lakes. Lake Colville feeds a branch of the Anderson River, and according to Indian report has another outlet in the shape of a subterranean channel communicating with Hare-Skin River and the Mackenzie system, but this theory requires verification. The Anderson is about two or three times as large as the Seine, and towards its mouth attains a breadth of 2 or 3 miles. It contains some capital fish, but in small quantities. The discovery of the Esquimaux Canal, which joins the mouths of the Mackenzie and Anderson Rivers, and of the Esquimaux Lake, have been already referred to in our October number, p. 323.

Speaking of the trade done in the region of the Athabasca, Mackenzie River, the Abbé Petitot refers gratefully to the kind treatment shown to all residents by the Hudson Bay Company, who enjoy a monopoly there. The trade is wholly confined to furs and the like; such as skins of the bear—yellow, white, and grizzly—the fox, lynx, marten, wolf, glutton, ermine, musk-ox, seal, and musk-rat, and plumages of the trumpeter swan, and eider-duck. The Athabasca and Great Slave Lakes are rich in martens, lynxes, sables, and foxes; Fort Good Hope yields gluttons, beavers, wolves, and fine black foxes, whose skins fetch 30*l.* in England, and 40*l.* in America; Great Bear Lake is noted for its otters and beavers, which are also found along the course of the Mackenzie River, while from the shores of the Arctic Ocean are brought skins of musk-oxen, bears, and white foxes, and swan's plumages. As to the value of the total export trade in furs, Father Petitot is unable to speak, but he testifies with regard to the Mackenzie River, that twelve boats of eight tons apiece, annually journey southward, and giving a minumum of 60 packs of skins to each boat, that gives a total of 720 packs for all the boats. Now as each pack weighs from 70 to 85 lbs. avoirdupois, this amounts in round numbers to a total weight of 60,000 lbs. annual export for the Mackenzie district alone. Money is not used in commercial transactions, the unit of exchange being a beaver's skin or *pelu*, as it is termed by the Canadians, which as a rule represents two shillings sterling, thus the skin of a bear, musk-ox, or silver fox, is worth four pelus, or eight shillings, ermine and musk-rat skins, six a shilling, and the black fox skin, the most expensive of all, one pound apiece.

The North-West territory is divided into ten districts, of which Athabasca and Mackenzie are the northernmost, each district having its chief trader or superintendent. The forts consist usually of three or four wooden buildings within a square wooden palisade, between 18 and 20 feet in height, with towers or bastions at each angle. The chief house is occupied by the officer and his clerks; on either side are the store-houses for provisions and merchandise, and a fourth long house is divided into sets of two rooms apiece for the servants. The chief factories, such as York factory, Forts Garry, Nelson, and others, are built of stone, and boast some small field-pieces. The Abbé gives a good notion of the distance between these stations, by comparing one of the districts to France, and imagining a factory at the mouth of the Seine, a fort at Paris, a second at Bordeaux, a third at Brest, a fourth at Marseilles, and so on for eight or ten forts.

Once a year, in the early part of June, all the dependent forts in the Mackenzie districts send their furs to the chief station, whence the Mackenzie flotilla convey them as far as the *portage* La Loche, a journey which takes at least two months. Here the furs are exchanged for European goods, brought by boats, which have come up from Fort Garry and Norway House, and the boats having exchanged their respective cargoes, retrace their steps. The furs are taken to York factory, whence they are exported to London. The European goods are conveyed to Fort Simpson, where they are divided among the officers of the different forts, who are thus enabled to pay their debts to the Indians, and give them advances of ammunition, tobacco, hatchets, knives, blankets and provisions.

The chief traders have no fixed salary, but are allowed a share of the profits: this is never lower than 600*l.* a year for the first class of officers, and 300*l.* a year for the second. The clerks get from 75*l.* to 100*l.* per annum, the post-masters 40*l.* to 75*l.*; the half-breeds, who take charge of the boats in their annual journeys, from 28*l.* to 45*l.*, and ordinary servants, 24*l.* All these salaries are exclusive of board and lodging, so, as the Abbé remarks, the Hudson Bay Company's servants are by no means the worst paid in the world.

The white and half-breed population of the Athabasca Mackenzie district numbers about 1000, and include natives of England, Scotland, Ireland (very few), the Hebrides, and Canada, the half-breeds being

principally of Franco-Canadian origin. The pure French element is represented by fifteen Roman Catholic priests, and ten or twelve lay brothers.

The Indians number about 10,000, and are divided into three great branches, the Esquimaux who live to the north, the Algonquin who frequent the Peace and Athabasca Rivers, and the Dene-diniye, a large family which comprises the inhabitants of the Athabasca and Mackenzie districts, as well as of Alaska and British Columbia.

In concluding his paper M. Petitot refers in very grateful terms to the kind encouragement and support accorded to him and his fellow missionaries by the Hudson Bay Company.

THE UNITED STATES SURVEY IN THE SAN JUAN COUNTRY.*

THE San Juan country in the south-west angle of the State of Colorado, in which the United States Geological and Geographical Survey, under Dr. Hayden, was engaged during the season of 1874, is a region characterized by a complicated system of mountains (forming the western spurs of the Rocky Mountains), which appear not in a succession of ranges but in a great mass. The character of the volcanic rocks which compose them and extend for an area of more than 5500 square miles, from the San Luis Valley westward as far as the high masses of mountains and plateaux, is one of great interest to the geologist, as it demonstrates an enormous amount of activity during a probably short period of time, the sudden occurrence of rocks intimately associated with others entirely different being frequent.

The district is one of interest on account of its mineral resources, which comprise silver, gold, and other metals. Operations are carried on at several points in the vicinity, and on tributaries of the Animas River, but during the time of Dr. Hayden's visit comparatively little work was being done. The greater portion of the miners' time and energy was devoted to "prospecting," and but few had developed their lodes to any extent. One difficulty under which they laboured was the want of available capital, and of a place where the ore might readily be converted into cash.

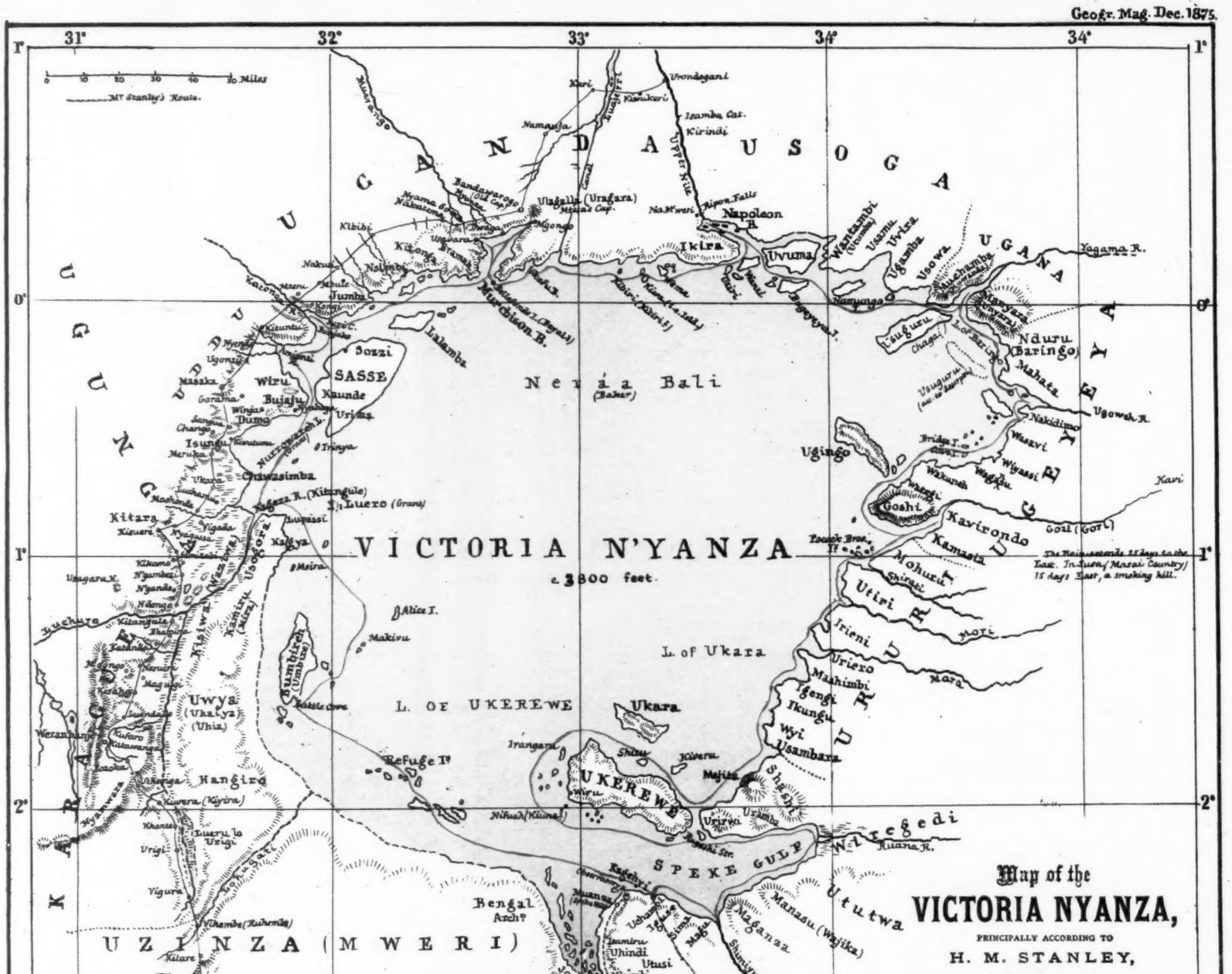
Baker's Park, the centre of the great mining district in this region, is small in area, and would probably be disregarded if situated in other parts of Colorado, but surrounded as it is by the most rugged mountains in the territory, if not in the whole Rocky Mountains, this little area of plain land becomes an object of curiosity and interest. It is in reality nothing more than the bed of the deep cañon of the Animas River spread out at the lower end to a width of a mile or two. Its height above the sea is 9400 feet and as the passes leading into the valley range in height from 1300 to 3200 feet above it, a good notion of its seclusion may be formed. Here, in 1862, Baker and his little band were mercilessly driven by the Indians. How many fell in the massacre, how many starved or froze to death seems even yet to be veiled in mystery. But how the present survivors ever escaped might well remain a mystery when we consider the great depth of snow that must have covered the mountain passes, and that the country was then perfectly unknown.

The route of the surveyors lay from Colorado Springs over Ute Pass into South Park, thence down the Arkansas River and across the range at Puncho Pass into the San Luis Valley, and from thence into the San Juan country. The character of the country, abounding in peaks from which fine views could be obtained, appears to have been very favourable for topographical delineations, but the detailed description thereof does not call for any extended notice. While engaged in taking observations from one of the peaks above 13,000 feet in height, Messrs. Wilson and Rhoda, two of the party, were very curiously affected by the electricity with which the air was charged. At first the presence of the electricity was manifested by a tickling sensation at the roots of the hair, but this soon increased, and a ticking sound ensued, accompanied by a peculiar sound described as "almost exactly like the frying of bacon." The clouds at this juncture were yet distant, but fast approaching, and as the force of the electricity increased one of the instruments commenced to click like a telegraphic machine, the clicks increasing till a musical sound was produced. A similar but finer sound was emitted by the pencils in the hands of the observers when the top was laid back so as to touch the hand. A sudden relief was brought about by the lightning striking a neighbouring peak, but shortly after the clouds began to ascend and approach their station, and the phenomena increased in force after each successive stroke of lightning. The barometer when taken out of its leathern case and held vertically gave forth such a terrible humming as to compel Mr. Rhoda to seek shelter between two rocks before venturing to return it to its case. Mr. Wilson was soon compelled to abandon his instrument, for it was also producing such a humming that, combined with the noises issuing from thousands of angular blocks of stone, the observers were almost distracted. A stroke of lightning suddenly brought relief, and Mr. Wilson made a dash for his instrument, but even then the tension was so powerful that he received a strong electric shock where the tripod came in contact with his shoulder. Both surveyors then made the best of their way down the mountain, and they had not got 30 feet from the summit when it was struck. On other occasions phenomena of a very similar character were experienced, but the surveyors took care not to expose themselves so freely to their influence.

Among the numerous peaks ascended by the topographers the Rio Grande Pyramid deserves mention. Its pyramidal form is almost perfect, there being enough bluff intermingling with the *débris* slopes to give relief. An ascent of it on foot was quite easy, and the party was enabled to reach the fine summit (13,773 feet).* The highest peak surmounted was Mount Wilson, and the ascent of this was exceedingly dangerous owing to its extreme steepness and to the presence of crevasses, precipices, and loose stones. From its summit, 14,280 feet † in height, a good *coup*

* Based on the official *Bulletins* published by the Department of the Interior, Washington.

* All the heights were determined by barometer observations.
† Ibid.


Map of the
VICTORIA NYANZA,
PRINCIPALLY ACCORDING TO
H. M. STANLEY,
By E. G. Ravenstein.
Scale, 1:2,000,000.
VICTORIA N'YANZA
± 3800 feet.
L. of Ukara
L. of Ukerewe
Nerá Bali
(Baker)
SPEKE GULP
Napoleon R.
Ikira
Uvuma
Usoga
Uganda
Nduru (Baringo)
Sesse
Kaunde
Wiru
Bujaju
Chwasimba
Kitara
Luero (Grana)
Uwya (Ukalya) (Uhia)
Hangiro
Ukara
Ukerewe
Refuge I.
Alice I.
Makiru
Irangara
Majita
Shirati
Mohuru
Utiri
Irieni
Uriero
Mara
Maahimbi
Igengi
Ikungu
Wyi
Usambara
Kavirondo
Gosh
Uginga
Nakidimo
Ugowa R.
Yegama R.
Napoleon R.
Kari
Isamba Cat.
Kirindi
Namasija
Ulagalla (Uragara)
Nipoa Falls
Ikira
Uvuma
Usoga
Uganda
Usowa
Yegama R.
Nduru (Baringo)
Mahata
Nakidimo
Ugowa R.
Uginga
Wasvi
Wyassi R.
Kavirondo
Gosh
Kari
Mohuru
Utiri
Irieni
Uriero
Mara
Maahimbi
Igengi
Ikungu
Wyi
Usambara
Shirati
Majita
Ukara
Ukerewe
Irangara
Refuge I.
Alice I.
Makiru
L. of Ukara
L. of Ukerewe
Speke Gulf
Nyanza
Kagehyi
Uzinza (Mweri)
Ukungu
Ukhanga
Usmaow
Tuzu
Marya
Ututwa
Manasu (Wajika)
Shanjia R.
Duma
Bengal Arch?
Kitara
T'hungu
Nyakasenye Hills
Nyamanira's
Ukwimba
Uhindi
Utusi
Ulaswanda
Usabi
Kiuana R.
Wi Icgedi
Kavirondo
Gosh
Kavirondo Gulf
Goal (Gori)
Kavi
Wasvi
Wyassi R.
Nakidimo
Ugowa R.
Yegama R.
Napoleon R.
Ikira
Uvuma
Usoga
Uganda
Nduru (Baringo)
Mahata
Uginga
Bridge I. of Sesse
Sesse
Kaunde
Wiru
Bujaju
Chwasimba
Kitara
Luero (Grana)
Uwya (Ukalya) (Uhia)
Hangiro
Ukara
Ukerewe
Refuge I.
Alice I.
Makiru
Irangara
Majita
Shirati
Mohuru
Utiri
Irieni
Uriero
Mara
Maahimbi
Igengi
Ikungu
Wyi
Usambara
L. of Ukara
L. of Ukerewe
Speke Gulf
Nyanza
Kagehyi
Uzinza (Mweri)
Ukungu
Ukhanga
Usmaow
Tuzu
Marya
Ututwa
Manasu (Wajika)
Shanjia R.
Duma
Bengal Arch?
Kitara
T'hungu
Nyakasenye Hills
Nyamanira's
Ukwimba
Uhindi
Utusi
Ulaswanda
Usabi
Kiuana R.
Wi Icgedi

d'œil of the drainage and topography could be obtained.

Mr. Rhoda, the topographer of the party, appears to have been much struck with the wild beauty of some of the peaks, and on one occasion, when the sudden appearance of a grizzly bear rudely dispelled the romance of the scene, he feelingly gave vent to his indignation as follows:—

"Of course in a climb as long and difficult as this, our instruments and books were all we cared about bringing with us, and for this reason our guns were left behind. We were much surprised to see an animal in this place. It is ever thus; when you feel you are treading a path never trod by a living thing before, if some such vile worldly thing as a cast-off paper collar or an empty whiskey-bottle does not intrude itself on the sight, some disgusting quadruped must needs break the precious solitude and scatter your airy castles to the winds. To show our utter disgust for all animate things that could not live below this altitude, we yelled and threw stones after the bear till he was finally lost to sight, far down the mountain side. In our hate we even wished he might have been in a position whence we could have rolled rocks down on him."

Some peculiar forms of erosion are exhibited in Eastern Colorado in the case of some isolated castellated columns of sandstone, from 40 to 60 feet in height, which are remnants of beds that originally spread over a large area near the head of Monument Group. Further to the north, near the sources of Plum Creek, a branch of the South Platte River, there is a pretty full series of the sedimentary beds exposed by the upheaval of the mountains. For a distance of 20 miles there is a belt of country about half a mile in width, in which these eroded sandstones present great variety of forms, a result attributable to the great variety of the texture of the strata within a few feet. The irregular laminæ of deposition are quite remarkable, showing that the entire group of sediments was deposited in moving waters. Dr. Hayden remarks that the scenery along the base of the Colorado range (of which the district referred to forms part) will always be regarded with the greatest interest by tourists, as well as geologists, and has no parallel in any other country of which he has knowledge, either from personal examination or from the descriptions of other explorers.

As far as regards natural history, collections were made at nearly every camp on the whole route. Wildfowl, such as geese, ducks, and gulls were common; only two species of crustacea, *Gammarus robustus*, and *Hyallela inermis* were seen; on the slopes of the Rocky Mountains antelopes, mountain sheep, and grizzly bears were found, the last having been met in the most inaccessible places imaginable. Some snakes and frogs were secured at Hot Springs, Middle Park; and south of the mountains lizards began to appear in great numbers and variety, and increased as the party got further out on to the dry plains. The largest part of the material brought home comprised land and freshwater shells, and of these a speciality was made.

STANLEY'S EXPLORATION OF THE VICTORIA NYANZA.

THE three letters recently published in the *Daily Telegraph* furnish a preliminary record of a most successful geographical exploration, which was carried on in spite of obstacles to which a traveller less determined than Mr. Stanley would have succumbed. We are supplied, for the first time, with authentic information respecting the configuration and extent of the Victoria Nyanza, and of its most considerable tributary river, the Shimiyu, which for the present must rank as the most southerly course of the Nile. The letters of Mr. Stanley are of a fragmentary nature, and his map, which may be inspected at the rooms of the Royal Geographical Society, is but a mere sketch. On his return he will no doubt furnish more ample information. Still, the results attained by him, as far as they have been communicated, are of such importance and interest that we feel sure our readers will be glad to find them embodied in the two maps accompanying the present number of the *Geographical Magazine*.

MPWAPWA TO THE LAKE.

From Mpwapwa, a village in Usagara, Mr. Stanley travelled through Northern Ugogo and the forest region of Mgunda Mkhali, leaving the residence of the vain chief of Mvumi far to the south. At Mzanza he appears to have struck his old track, when travelling to Ujiji, and to have continued along it as far as Mukonduku (2800 feet*). He then proceeded north, diverging occasionally to the west and north-west, and finally reached the lake at Kagehyi, by a route to the east of that followed by Speke, and bounded towards the east by the country of the predatory Wahumba or Masai.

The village of Mtivi (2825 feet) is stated to be 20 miles to the north of Mukondoku, but soon afterwards he ascended a plateau, over which he travelled during the remainder of his journey. The altitudes observed by him varied between 3800 and 5100 feet, and jungles of acacias covered nearly the whole country.

Having crossed the district of Usandawi, abounding in elephants, he reached Muhalala, a village of Uyanzi or Ukimbu.† There the guides whom he had engaged in Ugogo deserted, and although he succeeded in obtaining others, these likewise escaped at the end of the first day's journey, and left Stanley on the margin of a vast wilderness, covered with acacia jungle. The march through this was attended with much hardship, as no water could be found. Six men died, and when the caravan at last reached Uveriveri, a small village recently established on the southern confines of Urimi, the whole of his men were exhausted by hunger and fatigue. Supplies for so large a number could not be obtained from the four families inhabiting the village, and Stanley therefore picked out twenty of the strongest men, whom he despatched to Suna, a district 29 miles to the north-west, for a supply of grain. They succeeded in their mission, but during their absence two more men died.

The next day's journey led to the base of a rocky hill, overlooking an open plain of vast extent. On

* These altitudes are those given in Stanley's letters.

† We understand this to be a village in Uyanzi inhabited by Wakimbu.

the following day he reached Suna, the inhabitants of which struck Stanley as being a fine race of men. They wore no clothing, and even the women contented themselves with scanty goat skins. The chiefs reluctantly permitted the caravan to remain here some time, and consented to supply provisions. During the four days which the caravan stayed here six more men died, and Edward Pocock, one of Stanley's European servants, fell ill with typhus fever, to which he succumbed on the 17th January at Chiwyu, a village only a few miles to the north of Suna, and close to the water-parting which divides the waters flowing north to the Nyanza from those flowing south. This village, Stanley tells us, is 400 miles from the sea, and 320 miles from the Nyanza, and we judge from this that his further route must have been very circuitous.

In the district of Mangara, two days further north, Kaif Hallek, who had carried Kirk's letter-bag to Ujiji, was waylaid and murdered. This was the first act of hostility on the part of the natives.

On the 21st of January Stanley reached the village Vinyata, in the district of Ituru,* and in the valley of the Liwumba River. The latter is 20 feet wide and 2 feet deep during the dry season, but swells considerably after rains. All the rivers to the north of Chiwyu drain into it, and thus far it is the most southerly source of the Nile known. It flows towards the west, and where Stanley reached it, there were numerous villages surrounded by plantations, and having a population of from two to three thousand souls. The inhabitants received the strangers coldly, but after some time they consented to supply provisions, and even the medicine-man, who is treated with great deference, condescended to barter an ox for double its value in cloth and beads. The sight of Stanley's ample stores, however, roused their cupidity, and on the 23rd January they made an attack on the camp, which was promptly repulsed with a loss of fifteen men killed on the side of the enemy. Nothing daunted by this rough reception, the natives returned to the assault on the following day. Stanley sent out four parties with orders to destroy the villages and to seize the cattle. Stanley lost twenty-one men on that day, the enemy thirty-five. The fighting was renewed on the 25th, but the natives then retired from a conflict which had proved so disastrous to them, and early on the 26th Stanley struck his camp, and departed with a stock of provisions for six days. On the 28th he reached Mgongo Thembo in Iramba,† and here he mustered his people, and found that, out of 314 men with whom he had started from the coast, there only remained 194. No less than 120 had died from disease, had been killed, or had deserted.

The notes on the further progress to the lake are of a very fragmentary nature. North of Iramba Stanley crossed what was apparently an old lake basin, or an arm of the Nyanza, 40 miles in width, the altitude of which (3775 feet) he found to be but little more than that of the lake. The Luwamberri River flows through it, and after rains the whole of this extensive basin stands under water.

* Burton conjectures this to be identical with Utatura (see *Geographical Magazine* p. 354). In his *Lake Region*, p. 279, the Watatura are said to inhabit the country between Tura and Usmao, and they are described as a "wild pastoral race."

† Iramba is referred to in Burton's *Lake Regions*, p. 164. It is stated to be 8 days' journey to the north of Tura, and 5 from Rubugo.

Having penetrated through the jungle bounding the western side of this basin, Stanley entered Usukuma, the first district of which is Mombiti. He describes Usukuma as a densely populated country abounding in cattle, and as consisting of a series of rolling plains intersected by ridges of hills. The Liwumba is called here Monungah, and Stanley travelled for many miles along its winding course.* The Luwamberri and Duma are its principal tributaries, and it enters the Nyanza under the name of Shimiyu. Having traversed Usiha, Mondo, Sengerema and Marya, districts of Usukuma, our traveller crossed Usmaow, and then returned into Usukuma, reaching the Nyanza on the 27th February, 1875, at Kagehyi, one of the principal ports resorted to by slave dealers, in the district of Uchambi. His caravan now numbered only 3 Europeans and 166 natives; 28 men had therefore died or deserted since he left Iramba.

At Kagehyi, which he states to be a few miles east of Speke's Muanza, Mr. Stanley read his aneroids and determined the boiling-point. From the latter the altitude of the lake has been computed by Captain George at 3808 feet, which does not differ materially from the result obtained in the same manner by Captain Speke, viz. 3740 feet. The aneroid observations, roughly computed by Stanley himself, give 3550 to 3675 feet.

CIRCUMNAVIGATION OF THE NYANZA.

Having launched the 'Lady Alice,' a light boat, which he had carried in pieces all the way from the coast, Mr. Stanley embarked on the 8th March, with a picked crew of eleven men and a guide, and circumnavigated the whole of the lake in fifty-eight days. He first explored a gulf at the south-eastern corner of the lake, which he named in honour of his predecessor, Speke. The districts of Sima and Magu are inhabited by tribes speaking the same language as the Wasukuma, but governed by independent chiefs. The Shimiyu River, which is 1 mile wide at its mouth, but soon contracts to 400 yards, separates Magu from Maganza, which, like the neighbouring Manasu, is a hilly country, but thinly inhabited, and the resort of elephant-hunters. The inhabitants of these two districts, as well as those of Ututwa, further east, speak a different language.† On reaching the bottom of the gulf the aspect of the country changes completely. A marshy plain extends far inland. It is traversed by the Ruana River, and inhabited by the Wiregedi, a savage tribe, hostile to strangers. On the north Speke Gulf is bounded by the hilly districts of Shashi, Uramba and Urirwi.‡ They are separated from each other by sterile plains, and a thin line of verdure extends only along the margin of the lake. These three districts appear to constitute continental Ukerewe, the island of the same name being separated from them by the Rugeshi Strait. Mr. Stanley circumnavigated it, and describes it as a verdant island, having bold coasts, and abounding in cattle and ivory. The king, Lukongeh, is an amiable man, and the inhabitants are an enterprising

* Stanley estimates the entire course of the Shimiyu at 370 miles.

† The Manasu people are called Wajika by the Ututwa, possibly Speke's Washaki, three marches east of Muanza.

‡ Thus spelt on Stanley's map. In his letters, as printed in the *Daily Telegraph* and *New York Herald*, we meet with five different readings, viz., Ururi, Urirur, Urima, Urirari and Urirwi.

people, who visit Ugeyeye, Usongara, and Uzuiza (Uzinza?) in their canoes. Many islands are tributary to it, the chief among them being Ukara, the inhabitants of which rejoice in charms and medicines. Others are Nifuah, Wezi, Irangara, and Kamasi. On reaching the northern end of Rugeshi Strait, Stanley had the Majita table mountains towards the north-east, rising boldly from the lake-shore to a height of 3000 feet, and bounded by extensive plains on the land side.

He then shaped his course towards the north, following the coast of Ururi, a level country, remarkable for its wealth in cattle.* The Shirati is the most important of its rivers. Having passed the wooded plains of Mohuru, Stanley found himself at the entrance of Kavirondo Bay, and had the bold mountain shore of Ugeyeya in front of him, which contrasted strikingly with the flat country towards the south. Ugeyeya is much resorted to by ivory and slave-hunters, and its timid inhabitants are preyed upon by their southern neighbours, the Waruri, by the Masai and by Arabs. Even whilst Stanley was on the lake one of the latter was building a dhow of twenty or thirty tons on Ukerewe Island, to enable him more vigorously to carry on the slave trade.

From the head of the Bay of Kavirondo the plains are said to extend for twenty-five days' march towards the east. Susa is a district of the Masai, fifteen days' in the same direction, where there are hills, which emit smoke and occasionally fire. The Gozi River, which flows into the bay, rises towards the north-east, near Kavi.†

From this bay Stanley sailed between the bold headland of Goshi and the elevated Ugingo Island, which afford shelter to the canoes of the natives, and reached Bridge Island,‡ thus called by him from a natural bridge of basalt, 20 or 30 feet long, and 12 or 15 feet wide. From the top of this island the view eastward is over the flat districts of Wasavi and Nakidimo, which are slightly wooded, and whose surface is varied by isolated conical hills.

On reaching Nakidimo Bay, Stanley attempted to enter into communications with the natives, but failed, and thence passed round into a larger bay, into which the waters of the Ugoweh River discharge themselves. Hippopotami abounded, and the 'Alice' avoided a hostile collision by speedily taking to flight. The villages along the coast of Mahata were more numerous, and the population more dense than at any other locality visited hitherto. Mr. Stanley attempted to land, but his intention was frustrated by the hostile attitude of the inhabitants, and he anchored during the night at an island.

Nduru, the next district towards the north, and the last in Ugeyeya, is called Baringo§ by the inhabitants of Ugana. It has a coast-line about 15 miles in extent, deeply indented, with several bays almost land-locked, and large islands close to the shore.*

Mr. Stanley thence sailed into a bay forming the north-eastern extremity of the lake. It is bounded on the east by the hilly country of Manyara or Unyara (the inhabitants of which speak a language kindred to that of Uganda,) on the west by Muchamba and Chaga, and Usuguru, a slug-like island, standing across its mouth, shuts it almost completely off from the main body of the lake. The country on the upper portion of this bay, Ugana, is flat, and the river Yagama enters it there. Mr. Stanley's map does not bear out the description of this bay which he gives in the letter written from M'tesa's capital. He there says that the island of Chaga runs directly north and south for 8 miles, at a distance of 12 miles from the coast of Unyara; that a narrow strait separates it from the island of Usuguru; and that the latter runs in a S.S.E. direction to within a distance of 6 miles from the eastern coast of the mainland. On our map we have indicated the features thus described by dotted lines, and the "lake of Baringo" (Bahari 'Ngo) would thus be connected with the main body of the lake by a narrow channel, as told by Speke.

Usoga extends from Chaga Island to the Napoleon Channel, and Mr. Stanley visited its coast districts Usowa (where his arrival was greeted by hostile demonstrations), Ugamba, Uvira, Usamu, and Utamba (Wantambi on map). Near the latter large islands again become frequent. On approaching Uvira, the most considerable amongst them, the natives, by a show of friendship, induced our explorer to approach close to the land, and then treacherously greeted him with a shower of "large rocks." Stanley retaliated by shooting a man with a revolver, and then proceeded up the channel which separates Uvuma from Bugeyeya. There, close to the shore of the former, he encountered thirteen canoes, carrying about a hundred warriors. This led to a fresh conflict, which ended in Stanley shooting three of his assailants, when they took to flight. He anchored at night in the channel, in lat. 33° 40′ 15″ E., long. 0° 30′ 9″ N. On the following morning he felt a current setting towards the north, and found himself in the Napoleon Channel, which separates Usoga from Uganda. He continued to within half a mile of the Ripon Falls, whose noise he heard distinctly. A few islets dot this channel, close in shore, and its entrance is closed by the larger islands of Uziri and Wanzi, which stretch obliquely towards Uvuma. Passing between the coast of Ikira (Kira) and the island Uziri, Stanley took his course towards the west, procuring a guide at Kiwa (*i.e.* island), halting at Kibibi Island, and then proceeding to Ukafu, a horseshoe-shaped bay, whence he despatched a messenger to M'tesa, to announce his arrival. Incidentally we are told that there is no river called Luajerri, or Luaserri, that word meaning merely "still water," and being applicable to any creek or inlet. Stanley himself discovered a crooked inlet named Mwaru Luaserri, near Murchison Bay, which extended for several miles inland. He says that the current there set alternately for two hours to the north, and then to the south, a phenomenon noticed in all the inlets on the coast of Uganda. On his map we find a "canal" laid down, which follows the direc-

* He mentions the following districts as belonging to Ururi, viz., Wye, Irieni, Uriero, Igengi, Utiri, Shirati and Mohuru. Utiri (Thiri) is mentioned by Burton as a district between Urudi (Ururi) and Uhamba. The name "Usambara" appears only on the map. Majita, according to Burton, is inhabited by Makwiya (Wye?).

† Kavirondo is undoubtedly the same as Wakefield's Kavirond; Ugeyeye may be Ligeyo.

‡ He states the native name to be Kiwa, which is, however, merely the native word for island.

§ Baringo is mentioned by Krapf, Speke, Wakefield, and others.

* Mr. Stanley's map hardly bears out this description.

tion of Speke's Luajerri, and connects the lake with the Nile. The greatest depth of the Nyanza thus far was found by Stanley to amount to 275 feet.*

At Beyal Island (Bellefonds of map?) Stanley was welcomed by a fleet of canoes sent by M'tesa, and on the 4th of April he landed at Usavara, a temporary residence of the king on Murchison Bay, where he stayed to shoot birds. Murchison Bay is described by Stanley as extending from lat. 0° 15′ N. to 0° 27′ N., and from long. 32° 38′ to 32° 53′ E. At its mouth it is 4 miles wide, but within it expands to a width of 12 miles, and the term "creek" can be applied only to its upper portion, between Dwaga and Mngongo. The present residence of M'tesa is called Ulagalla or Uragara. It stands on an eminence near the head of the bay, the royal palace occupying the centre, and seven broad avenues radiating from it. Bandaw, the old residence, where Speke and Grant visited the king, stands further west. During the Ramadan the king resides at Dwaga, on Murchison Bay.

Stanley speaks of the king in terms of the highest praise. His power, he tells us, extends to Uganda, Unyoro,† Usoga, Karague, and Usui, and a naval review, in which 84 canoes, manned in the aggregate by 2500 men, took part, gave him a favourable idea of his military resources. He is likewise stated to maintain a body-guard of 200 warriors. The king and all his officers now profess Islamism, and dress in Arab costume, but is nevertheless said to be anxious to receive Christian missionaries. There is now no daily butchery of men or women; seldom one suffers the extreme punishment."‡

At M'tesa's capital Mr. Stanley had the good fortune to meet with M. Linant de Bellefonds, one of Colonel Gordon's officers, to whom he entrusted a letter. This young officer, with 36 of his followers, was massacred by the Bari on his return to the north, and Stanley's letter was flung aside, but found afterwards by a detachment sent out by Colonel Gordon.

On the 17th April Stanley left Murchison Bay on his return to the south. The king had promised him an escort of 30 canoes, and ten of them accompanied him as far as the Katonga River, where their commander said he must go to Sasse to procure the remainder. The Katonga River is not very large, and has but one mouth. The Amionzi enters the lake about 8 miles to the W.S.W. of it.

Stanley being anxious to return to his camp at Kagehyi, and the Uganda chief not returning from Sasse, left the Katonga on or after the 20th of April, attended only by two boats, He tells us next to nothing as regards the remainder of his journey, but the nomenclature of his map (Battle Cove and Refuge Islands) points to a hostile conflict and to a fortunate escape after dire distress. Ugunga§ is said by him to extend to the Kagera or Kitangule River, and south of it he mentions the districts Usongara, Kamiru, Uwya and Uzinja (Uzinza), called Mweri by the Wanyamuezi. The latter extends to Jordan's Nullah, where Usukuma begins.*

On the 5th of May he was back at Kagehyi, and found that Frederick Baker, one of his European servants, had died on the 23rd of April. By this time Mr. Stanley has probably explored the south-western corner of the lake, and is on the way to the Mwutan N'zige or Albert Nyanza.

Our Map of the Nyanza

is principally based upon that of Mr. Stanley, which we have adjusted to the positions determined astronomically by Captain Speke, and to the accounts published by that traveller and by his companion Captain (now Colonel) Grant. Mr. Stanley has himself observed the latitude daily and the longitude on frequent occasions, but as the results, as far as they have been communicated, differ considerably from those of Speke, and will probably be modified considerably, on his register of observations being subjected to a rigid examination, we have thought it best to discard them for the present. If any justification for this course be required, we may refer to his own map, which has been drawn without reference to the positions determined by him. The following list of positions proves this:—

	Positions given in Stanley's Letters.		Stanley's Map.	
	Lat.	Long. E.	Lat.	Long. E.
Kagehyi	2° 31′ S.	33° 13′	2° 16′ S.	33° 16′
Shimiyn (mouth)... ...	2° 35′	33° 33′	2° 22′	33° 33′
Speke Gulf, E. extrem.	—	33° 46′	2° 10′	33° 57′
Rugeshi Strait	—	33° 26′	2° 5′	33° 30′
Majita Bluff...	1° 50′	33° 10′	1° 55′	33° 40′
Nakidimo	—	34° 49′	0° 3′ N.	34° 49′
N.E. extremity of lake.	0° 34′ N.	34° 35′	The same.	
Anch'r'ge in Uvuma str.	0° 30′ N.	33° 40′	0° 35′ N.	33° 35′
Ulagalla	0° 32′ N.	32° 50′	0° 45′ N.	32° 57′
Katonga River	0° 16′ N.	—	0° 23′ N.	31° 45′

Taking Speke for our guide, the two crucial points of Stanley's whole work would be as follows, viz.:—

Kagehyi	lat. 2° 22′ S.	long. 33° 18′ E.
Ulagalla	,, 0° 22′ N.	,, 32° 47′

These differences after all are but of small importance when dealing with countries so imperfectly known. Far greater was the difficulty of accommodating Stanley's delineation of the western coast of the lake to Speke's route, and especially to the fragmentary notes published by Colonel Grant. The latter reached M'tesa's capital from Karague by a route different from that of Captain Speke, upon whose maps his observations have found no place. From Grant's *A Walk Across Africa* we learn but little to be utilized in the construction of a map. Far more valuable are the bearings communicated by him in vol. xlii. of the *Journal of the Royal Geographical Society*. At Chango, the position of which we can fix from a bearing upon Mweruka, Grant saw Sasse (Sesseh) Island, and an uninhabited islet to the south of it. At Kyabogo, Sasse was only 5 miles distant, and this place must therefore be looked for near the channel separating that island from the mainland on Speke's map. Captain Grant places Kyaboga in latitude

* On his MS. map there is a red circle to the S.S.E. of Murchison Bay, which may possibly indicate the spot at which he obtained this depth.

† A portion of Unyoro only has been incorporated with Uganda, and Kaba Rega, the king of that country, maintains an attitude of hostility towards Uganda, as well as towards Egypt.

‡ Colonel Long, who visited M'tesa in 1874, gives a very different account. On his first reception 30 men were decapitated, 8 to 10 on every subsequent one, and 7 to propitiate the evil spirits when he was about to cross the lake.

§ Ugunga is the trader's name for Unyoro, which encircles Uganda, and approaches the lake north of the Kagera or Kitangule.

* Usungara is mentioned by Colonel Grant under the name of Wuzungura; Uwya is evidently Grant's Uhia or Mohia, and Speke's Uhaiya; Kamiru may be Grant's Mira, and Bumbireh on Stanley's map is evidently Speke's Umbire.

Map of the Regions OF THE UPPER NILE

From the Explorations of

BURTON, SPEKE, GRANT, BAKER, KEMP, MARNO, LONG, STANLEY, CAMERON, AND OTHERS.

By E. G. RAVENSTEIN.

Scale 1:4,000,000.

0 — 50 — 100 Miles.

Stanley's Route

Col. Long, 1874.

30° 32° 34° 36°

4° 2° 0° 2° 4° 6°

Luba Mayo Ladoo Gondokoro (Ismailia) 1500 Beri Latuka Akkara Nyang Bari Fadoli Allia Bay Mambio Abukeya Baginze 4000 Makuruk Kakoreni Regina Poro Belania Iliria Tarangolle Obbo Labore Lokaya Niam Niam Bokak Loi Koshi Faigoro Fatiko 3500 Panjuli Shaga Dilibat Magriol Umiro Lira? Acka Mombuttu M'Karoli Chopi Kinora Kikunguru Masindi Mruli Ibrahim Pasha I. Mtingi (Mt. Gordon) Kaboyu Tembuki Kavirondo Nkole (Ukore) Kitara Kisumu Kumbireh 3800 ft. Ukerewe Speke Gulf Kagehyi Usoga Napoleon R. Ripon Falls Uganda Busoga Manyara Baringo Nandi Mt. Kenia Lumbwa Kosova Kibwezi Elgek Wakikuyu Ukhanga Usui Ugombe Bogue Uyungu Ufumbara Ruzewe Ugomba Urewe Uhha Uvinza Ukuranga Uvenda Ukonongo Karagwe Ruanda Unyamiyungo Kisoi I. Kanyara Kitunda Thunju Kikare Usambiro Usukuma Usindja Usumaow Marya Tuzu Sengerema Uzinza Livusinya Mondo Usiha Uyanzi Mukalala Usandawi Iramba Urimi Uvariveri Malonga Basin Mbogwe Magassi Uniemi Lake Basin Mpororo Mwutan Nzige (Albert Nyanza) N'yanza 3800 ft. Victoria N'yanza Masai Wahuma (Turu) Uzaramo Usagara Ugogo Kanyenye 3960 Mpwapwa Mukondoku Mhonda Mhinga Kima Kagura Hills Lake Rob

Stanford's Geographical Establishment, London.

0° 25′ S., longitude 31° 35′ E., but as there are two stages between it and Chango, we considered ourselves justified in shifting that place further to the east, and were thus able to reconcile Stanley with Grant, though not with Speke, who talks rather vaguely of "constantly coming in view of the lake" on the road to Ugonzi.

The area of the lake, as measured on our map, amounts to 25,300 square miles, including the islands, and to 23,900 square miles without them.

OUR MAP OF THE UPPER NILE REGIONS

is intended to show the position of the Victoria Nyanza with reference to the surrounding countries, and the valley of the Nile above Gondokoro. As far as the latter is concerned, we have adopted Speke's longitude for Gondokoro* (Ismailia), and Lieutenant Baker's longitude for Fatiko. The latter is deduced from two observations of eclipses of Jupiter's satellites (32° 37′ E.). At Gondokoro Speke observed five lunar distances, the resulting longitudes varying between 31° 31′ and 31° 59′ E., the mean being 31° 46′ E. Lieutenant Baker observed two lunar distances at the same place, his results differing to the extent of 1° 20′. Colonel Long's route to M'tesa's capital has been inserted from a rough sketch-map forwarded by General Stone, the chief of the Khedive's staff, but the maps of Baker and Speke still form the basis of our geographical knowledge of that part of Africa. Kemp's survey of the Nile up to Dufilé has been published in the *Proceedings of the Royal Geographical Society*, vol. xix., p. 325, and a map of Marno's route to the Makraka in the *Mittheilungen* of the Vienna Geographical Society, vol. xviii.

The stations at present occupied by Egyptian troops, as far as they appear on our map, are Lado, Wania, Regaf, Labore, Dufile, Fatiko, and Fauera.

As regards the supposed connection between the Mwutan N'zige and the Tanganyika, our map sufficiently speaks for itself. The itinerary along the lake, communicated by Sir Samuel Baker, does not amount to much when weighed against the ocular evidence to the contrary brought forward by Livingstone and Speke.

The country between the Nyanza and the Snowy Mountains of Eastern Africa, has been delineated on our map, principally from the itineraries communicated by Wakefield. Several of the lakes, which hitherto enjoyed a separate existence on our maps have been swamped by the Nyanza as actually surveyed by Stanley. The terms lake of Ukerewe, Ukara and Baringo evidently refer to different portions of the same sheet of water. A detailed itinerary communicated by Rebmann, takes us to Burgenei, within eight days from the lake, and we are told that Wasambiro come to that place from the lake to sell their cattle to the traders. These Wasambiro we believe to be the inhabitants of Stanley's Usambara, and Erhardt's route, the most direct of all, would appear thus to lead to Ururi.† Taking Erhardt's route as a basis, no difficulty exists to lay down approximately the routes communicated by Wakefield, and embodied by Mr. Keith Johnston with his usual care in a map published in the *Journal of the Royal Geographical Society*. Kavirondo can easily be identified from Stanley's map, and Chamwale is mentioned by Livingstone, and placed by him to the east of the former, nor does the route to the Baringo offer much more difficulty. Wakefield's informant on going north, passed through the country of the Wa-Ligeyo (Stanley's Ugeyeya), on his return the Likamasia Mountains (Stanley's Kamasia). The Wa-Suku, a dreaded tribe, are the Wasoga, of whose hostile disposition Stanley had some experience, and the Nyarus River, recalls the name Manyara on Stanley's map. This river may possibly be the lower course of the Gwaso Nyiro, which has its sources on the snow-clad Kenia.

The only lakes in this eastern region, the existence of which may be assumed with some degree of confidence, are those of Samburu and Naivasha. The latter is of comparatively small extent, and its water is brackish. The Samburu, far to the north, appears to be more considerable. The road to it leads through Burkeneji (clearly Livingstone's Burukinegge, the "frontier land between Kavirondo and the Gallas"). Lake Ro has been identified by some authorities with the small lake in Arusha, whilst Manyara or Olmanyara has to be looked for in the north, in the country of the Manyara.*

E. G. RAVENSTEIN.

* The missionary Dovyak places Gondokoro in long. 31° 42′ E. of Greenwich, but we do not know whether this is the result of actual observation.

† On Speke's first map Ururi is said to be an ivory port. On his subsequent maps this name has changed into Urudi and Urundi.

* Whilst going through the press we received an advance sheet of the *Mittheilungen*, which contains an article on Stanley's Exploration by Dr. Behm. That geographer looks upon the Baringo as a distinct lake, and considers it just possible that the Mwutan, and with it the Nyanza, may have no connection with the Nile at all, but that the former may send an effluent towards the W. or S., in the direction of the Lualaba.

† *Ultima Thule, or a Summer in Iceland.* By Richard F. Burton, with historical introduction, maps, and illustrations. (2 vols., W. P. Nimmo, 1875.)

Reviews.

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ULTIMA THULE.†

CAPTAIN BURTON, as usual, has gone to the root of his subject, and has treated it exhaustively. This publication on Iceland is not only an agreeable book of travels, but also a well-stored and judiciously arranged work, which will be of permanent value for future reference. In our number of *Ocean Highways* for October, 1872, p. 212, we furnished some account of Captain Burton's Icelandic tour. In his present work he gives not only a narrative of his travels, but also the results of his investigations and studies, and his matured views on the future prospects of the famous island and its people. He tells us that the main object of the book is to advocate the development of Iceland; and he holds three measures to be absolutely necessary. The first is the working of the sulphur deposits; the second is a systematic reform of the primitive means and appliances with which the islanders work in the fisheries; and the third is the extension of the emigrating movement, "now become a prime need, when the population is denser than at any period of its thousand year history."

The introduction opens with a discussion on the locality of Ultima Thule according to Strabo, Pomponius Mela, Ptolemy, and other ancient writers; and on the etymology of the word. The second section of the introduction is devoted to the physical geography of Iceland under the heads of genesis and geology, orography, hydrography, and climate. In the hydrographic section Captain Burton makes some interesting remarks on the Gulf Stream discussions, and records observations by Captain Tvede, an intelligent and observant Dane, and by the author himself, the tendency of which are to show a capricious variation of sea temperature, and none of the regularity which might fairly be expected from a gulf stream.

The historical section is an admirable summary of the occupation, constitution, and literature of Old Iceland, including, however, some original research of considerable interest. The author specially breaks ground in a new field of enquiry respecting the older colonists of Iceland who preceded the Norwegians—Welsh, Hebridian, and Irish; and certainly succeeds in showing a case worthy of being taken in hand by future scholars.

The section on the political geography of Iceland contains detailed information respecting the divisions, judicial procedure, population, vital statistics, character and appearance of the Icelanders, their social condition, family relations, and diseases; and the following section is equally complete on the subject of education and professions. The last part of the introduction is devoted to a series of notes on the flora and fauna, the agriculture, fisheries, and other industries of Iceland, concluding with a section on taxation, weights and measures, coins, prices, and commerce. Captain Burton also gives a very complete and valuable catalogue-raisonné of modern books of Icelandic travel, and a list of maps and charts of Iceland.

The remainder of the work, including the last 112 pages of the first and nearly the whole of the second volume, contains the narrative of Captain Burton's own travels, commencing with his voyage in the steamship 'Queen,' which touched at the Orkney, Shetland, and Færoe Islands, before reaching Reykjavik. We have already described the routes taken by Captain Burton in his Icelandic travels, including excursions round Reykjavik; a visit to the harbour of Hafnaford, which will eventually be the place of export for the Krisuvik sulphur-fields; a voyage round the north cape of Iceland to the Skagafjord on the northern coast; a trip to Hekla and the Geysers; and a more extended journey over a wild portion of Eastern Iceland.

A valuable appendix on sulphur in Iceland materially increases the value of these volumes. It contains reports by several scientific men, including that of the Althing, and notes on sulphur in Sicily, Transylvania, and the Andaman Islands.

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INDIA AND ITS NATIVE PRINCES. TRAVELS IN CENTRAL INDIA AND IN THE PRESIDENCIES OF BOMBAY AND BENGAL. By *Louis Rousselet.* (Chapman and Hall, 1875.)

THE work of M. Rousselet is magnificently illustrated, and is especially valuable as conveying a clear idea of Indian architecture, ancient and modern, and of Indian scenery. The drawings are admirably executed and reproduced, and recur at almost every page, the work containing no less than 317 illustrations and 6 maps. M. Rousselet avoided the beaten tracks, his main object being to visit the courts of native princes, and the ruins of ancient temples and palaces. Thus he wandered from the dominions of the Gaikwar, through Rajputana, Central India, and Bandalkhand, meeting with cordial receptions, and learning much of the lives of the princes of India, and of the history and internal economy of their courts. We had one or two bald statements of our treaty relations with native states, and of the families and positions of their rulers, but there was, until now, no book which, in any adequate way, brought home to us the daily surroundings and habits of these princes. It is in fulfilling this object that the great value of M. Rousselet's splendid work consists.

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ELEMENTARY LESSONS ON BOTANICAL GEOGRAPHY. By *J. G. Baker, F.L.S.* (Lovell Reeve, 1875.)

THESE lessons are reprinted from the *Gardener's Chronicle*, and are intended for educational purposes, and to encourage the acquisition of comprehensive and correct ideas of the laws and leading facts of plant distribution. The first two chapters are on the way in which the heat of a place is influenced by its latitude, and the influence of the distribution of land and sea on the distribution of heat. This is illustrated by a table showing the monthly average temperatures at sea levels, in January and July, with the extreme range, at places in different latitudes; and the fourth chapter treats of the distribution of heat, as influenced by height above the sea. The remaining chapters treat of the botanical characteristics of zones of heat and moisture, and of the influence of man on the distribution of plants. Mr. Baker's little volume is likely to prove useful, and seems admirably calculated to stimulate enquiry, and to give rise to a desire for further investigation in the mind of the student.

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NOTICE SUR UNE CAUSE PROBABLE DU CHANGEMENT . . . DANS LE COURS DE L'AMOU-DARIA. Par *M. le Major du Génie Herbert Wood.* (Genève, 1875.)

LA QUESTION ARALO-CASPIENNE. Par *M. le Major du Génie Herbert Wood.* (Genève, 1875.)

IN the first of the above papers, which are presented to us in the form of a short pamphlet, Major Herbert Wood explains succinctly what, to his mind, may have occasioned the change of direction in the course of the Oxus, from the Caspian to the Aral. He commences by forming an estimate of the amount of water withdrawn from the Oxus for irrigation purposes in the Khanate of Khiva. Taking the observations made by the Russian Expedition in 1874 as a basis, he arrives at the conclusion that during July, August, and portions of June and September, the proportion of water drained off constitutes ten-nineteenths of the entire bulk of the Oxus. He then quotes a passage from Lyell's *Principles of Geology* demonstrating that the effect of a powerful current and a large body of water is to prevent the deposit of sand and other detritus, which a weaker current soon suffers to accumulate. In the case of the Oxus the volume of the stream in winter and summer is probably (to speak roughly) in the proportion of 1 to 3. Formerly the deposits made during the winter months were carried off by the more powerful current of the summer, but on the formation of the canals, the current was weakened in force, and the formation of sandbanks increased year by year. Thus gradually did obstructions arise in the old bed, and the waters at last sought a more rapid fall, towards the sea of Aral. Major Wood quotes the recorded experiences of Abul Ghazi (1605-1660) and

Jenkinson (1559), to prove that the change of direction in the course of the Oxus took place between 1500 and 1575. The theory here adduced by Major Wood appears to be corroborated by local traditions. In *Khiva and Turkistan*, translated by Captain H. Spalding (1874), p. 183, we read that all the traditions of the Khivese unanimously assert that the Amú formerly fell into the Caspian, and they account for the phenomenon of its change of direction by saying that Sultan Mahmoud commanded canals to be excavated on the right bank, and that as these increased in number and proportions, those on the left bank began to dry up, and the waters of the Amú were at last turned aside into its more northerly direction.

In the second paper, which was read before the Geographical Society of Geneva, the author contends with great force and precision for the existence in times past of a huge freshwater sea, which included the Black Sea, the Caspian and the Aral, as well as large tracts of the adjacent deserts, which even now bear traces of having been at one time covered by water. The Bosphorus, he is of opinion, was formed in the year 1529 B.C., by a cataclysm occasioned by a volcanic disturbance in the Cyanean Isles. The theory finds support in the configuration of the Caspian, and its eastward extension, as shown by the old geographers. Another interesting point deserving of enquiry is—Did the Caspian then extend as far as the Upper Tobol? If so, the expedition of Alexander the Great, and even that of the Argonauts, must be credited with having possessed correct knowledge of the geography of this great sea, which they joined with the Arctic Sea. Pomponeus Mela says that the Caspian communicated with the Ocean by a long narrow channel, which widened out considerably to the south, and formed three great gulfs. Baron Heberstein, in his map of Russia, represents the Obi River as issuing from Lake Kitay which Jenkinson identifies with the Aral. Bergeron, in his travels, inserts a letter written to Mercator, informing him that one could pass by boat from Lake Kitay to the River Obi, and that on the former there were merchant ships manned by black men who had come by way of the Ardok or Oxus River. Other minor proofs of this interesting theory are cited by Major Wood, and we take the opportunity of adding one which, as a corroborative one, may appear of value, that is, that the fact of this great sea having had an outlet to the Arctic Ocean would satisfactorily account for the sweetness of its waters, which, since their isolation, so to speak, have become salt.

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ZWEITER JAHRESBERICHT DER GEOGRAPHISCHEN GESELLSCHAFT IN HAMBURG, 1874-75. (Hamburg 1875.)

THE second annual report of the Hamburg Geographical Society, edited by Mr. Friedrichsen, forms a handsome volume of 286 pages, and is illustrated by a number of valuable maps. In addition to a report on the present position of the Society, which has 315 members, it contains several papers of interest. Mr. Friedrichsen reports on the remarkable stone ruins of Namantal, or Tonape, one of the Carolinas, which covers an area of 500,000 square yards. They were believed, at one time, to have been the work of Spanish pirates, but are now supposed to date back for centuries, and to be the only existing evidence of a race long extinct. The plans accompanying this paper are of great interest, and if Mr. Friedrichsen's conjectures are to be accepted, these ruins prove that neither subsidence or upheaval have been going on at this island for centuries. Dr. Cohen communicates a most valuable report on a route from Lydenburg to Delagoa Bay, illustrated by a geological map. Captain Schück contributes a paper on Ocean Highways available for sailing vessels, and Dr. G. Rohlfs an instructive essay on Barbary.

DIE ALTE GEOGRAPHIE ARABIENS. Von *A. Sprenger*. (Bern, 1875.)

Dr. A. SPRENGER'S work on the ancient geography of Arabia is a work of great learning, in which that scholar analyzes Ptolemy's geography, and illustrates and explains it by reference to other authorities. Biblical scholars will find much in his book to interest them, and the discussion on Ophir, in particular, sheds fresh light upon the much disputed identification of that locality, which Dr. Sprenger tells us can be looked for only in Southern Arabia.

Cartography.

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Walker's Map of Turkestan.*

COLONEL J. T. WALKER has brought out a new edition of his map of Turkestan, which contains a considerable amount of additional matter. He has availed himself to the fullest extent of the vantage ground which his position in India gives to him, and not only the results of the explorations of the Kasghar Mission will be found on this map, but likewise the recent routes of the Havildar, of the Mullah, and of another native explorer, who crossed the Tibetan highlands from west to east, from the Pangkong Lake to Lhasa. The latter terminates with the margin of the map, a considerable distance short of its terminal point. Colonel Walker has likewise improved the map in many others quarters, and the most recent Russian authorities have been consulted by him, and it conveys now a very fair notion of the geography of a considerable portion of Asia. The article by Captain Trotter, in our September number, contains an excellent account of the additions and rectifications contained in Colonel Walker's new edition.

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Maps of India.

AMONGST the last batch of maps received from India there are hardly any which call for particular notice, for most of them are new editions of old maps, or continuations of works the character of which has been dwelt upon by us on former occasions.

The Indian Atlas has nominally been increased to the extent of seven quarter-sheets. We say nominally, for two of them (2 S.E., 9 N.E., and 131 N.W.) are filled up only in part, whilst the remainder, though filled up, are still without hills. These sheets have been engraved in India, under the direction of Mr. Coard, by native artists, who prove themselves fully able to do that kind of work as well as it could be done in Europe.†

The sketch map of India‡ is merely a new edition of an old map, revised up to June 1874. A correct map of India, on the scale of this one (32 miles to the inch), is very much wanted, and if really based upon the surveys, as far as they exist, and compiled with care and *judgment*, it might be utilised for a variety of purposes. The map before us fails even in the object which it is intended to illustrate, viz. the political divisions of the country, and we are not able readily to trace upon it the

* Turkestan and the countries between the British and Russian Dominions in Asia, mapped on the basis of the surveys made by British and Russian officers up to 1875. Compiled under the orders of Colonel J. T. Walker, R.E., F.R.S. Scale 1 : 2,027,520. Dehra Doon, 1875.

† Indian Atlas, sheets 2 S.E., 2 N.E., 9 N.E., 34 S.E., 52 N.E., 93 N.E., 131 N.W.

‡ Sketch Map of India, showing Political and Revenue Divisions, corrected to June 1874. Scale 32 m. = 1 in. 6 sheets. Calcutta, 1874.

extent of the various feudatory states. Equally unsatisfactory is a sketch-map of the Lieutenant-Governorship of Bengal, drawn on the same scale.*

A new edition of the Punjab map,† in four sheets, has likewise been issued. This is one of the most useful and interesting maps published by the Surveyor-General, and it is printed in a somewhat luxurious style, which is not perhaps quite warranted by its technical execution. The additions, as far as we can see, are not of any importance, and the results of the explorations which have been embodied in the last edition of Colonel Walker's map of Turkistan, have not yet been inserted upon it.

Turning to maps on a larger scale, and beginning our review as usual with the Lower Provinces, we first meet with four new sheets of the map of Bengal,‡ on a scale of 8 miles to the inch. This, in its way, is a capital map, and sufficiently detailed for most purposes. We regret that it should not have been planned to include the whole of India, for these interminable maps of separate provinces lead to confusion and to a great waste of paper, as will readily be conceded when the immense blank spaces on some of the sheets are looked at. On the map before us the heights of the trigonometrical stations are given, but many more altitudes, from railway levellings and other sources, might no doubt have been inserted, and would have proved of interest.

The Revenue Survey map of the District of Bhagulpoor§ has been increased by sheets 10 and 11, surveyed as long ago as 1846-50 by Captain W. Sherwill and Mr. J. Pemberton, but only now published, a delay fortunately very rare in India. The map will be completed in 17 or 18 sheets, of which Nos. 15, 16 and 17 remain to be published. The officers of the same survey have issued the six first sheets of a map of the district of Moorshedabad,‖ which may be described as a revised edition of the Pergunnah map published on the same scale some years ago. The surveys date from the years 1852-55 and 1867-68, and were made by Capt. W. S. Sherwill and Lieut. W. J. Stewart.

The Revenue map of the District of Darjeeling, from surveys made by Messrs. E. T. S. Johnson, P. A. G. Cowley and assistants, in 1861-67, has been completed in 5 sheets.¶ The drawing strikes us as being rather too minute for the scale on which the photozincograph has been published, an error rendered more prominent by the hilly nature of the country. The Revenue map of the Kooch Behar State,** in 7 sheets, now likewise lies before us in its complete state. The surveys upon which it is based were carried on, under the supervision of Colonel D. G. Vanrenen, by Messrs. J. H. O'Donel, T. C. Moran, W. Lane, and G. H. O'Donel, in 1868-70. In addition to these 1-inch maps, the officers of the Revenue Survey have published a plan of the Chinsurah Cantonment,†† surveyed in 1869-70 by Capt. W. J. Stewart.

To the officers of the Assam Revenue Survey we are indebted for a map of the District Nowgong,* surveyed in 1870-71 by Lieutenant D. C. Andrew, under the direction of Major G. Macdonald.

The publication of the Topographical Survey of Chota Nagpore is progressing steadily, and 54 out of a total of 75 sheets have now been published. Those mentioned below† are from surveys made in 1859-64 by Captain G. C. Depree and assistants. The two new sheets of the Ganjam and Orissa Survey‡ are by Captains G. H. Saxton and G. C. Depree.

We now pass over into the North-Western Provinces, and are called upon, first of all, to notice the progress of the Topographical map of Kumaon and Gurwhal,§ of which five new sheets have been published recently, leaving 18, out of a total of 37, for publication.

The officers of the North-West Provinces Revenue Survey have furnished 5 sheets of the maps of the districts of ¦Bareilly‖ and Bijnour.¶ The former is a new work, the sheets published being the result of surveys made in 1866-73 by Mr. J. Campbell. Lines of spirit-levelling and altitudes are inserted in red. The map of Bijnour has been completed by the publication of sheet 4, from surveys by Major A. D. Vanrenen.

The Punjab Revenue Survey is represented by an index map of the district of Dera Ghazi Khan,** which shows the districts, the roads, the principal towns and the trigonometrical points, and by the first 13 sheets of a 1-inch map of the state of Bhawulpoor.††

These latter are surveyed by Mr. E. T. S. Johnson, Captain D. C. Andrew and Mr. J. Campbell. There now remain only to be noticed the plans of four towns or cantonments, the titles of which are given below.‡‡ The plans of Erinpora and Nyanagar were surveyed by Captain George Strahan; that of Goona by Captain T. Holdich, and that of Rajkot by Captain A. Pullen.

We have on many occasions drawn attention to the revenue surveys of India, to the excellent and expeditious manner in which they are being carried on, and to the great benefits which are conferred by them upon the country. It is therefore with regret that we announce that the cadastral surveys in the North-West Provinces will be discontinued for the present. The money is wanted elsewhere, and the Indian government finds itself unable to continue these inquiries into the extent and value of its estates, and by doing so, surrenders nearly every chance of improving them. Let no one say that the work may be resumed when the finances of the country are in a more favourable position! A staff, like that now at the command of Colonel Thuillier, is not the creation of a day, and once dispersed, the work of organization will have to begin anew.

E. G. RAVENSTEIN.

* Sketch Map of the Provinces, comprising the Lieutenant-Governorship of Bengal; Provinces and District Divisions. Scale 32 m. = 1 in. Calcutta, 1872.

† The Punjab and its Dependencies, with portions of the North-West Provinces and Afghanistan. 20 m. = 1 in. Fifth edition, corrected up to 1875. Calcutta, 1875.

‡ Map of Bengal, 8m. = 1 in., compiled from Revenue Surveys. Sheets 13, 15, 19, 20. Calcutta, 1875. (To be completed in 20 sheets, of which Nos. 8, 14, and 18 are not yet published.)

§ Lower Provinces Revenue Survey: District of Bhagulpoor. Scale 1 m. = 1 in. Sheets 10 and 11. Calcutta, 1875.

‖ Lower ¦Provinces Revenue Survey: District of Moorshedabad. Scale 1 m. = 1 in. Sheets 1, 2, 3, 4, 6, and 9. Calcutta, 1875. Index map for do., scale 4 m. = 1 in.

¶ Lower¦ Provinces Revenue Survey: District of Darjeeling. Scale 1 m. = 1 in. 5 sheets. Calcutta, 1874.

** Lower Provinces Revenue Survey: Kooch Behar State, 1868-70. Scale 1 m. = 1 in. 7 sheets. Calcutta, 1874.

†† Lower Provinces Revenue Survey: Chinsurah Cantonment and environs. 1 in. = 1 m. Calcutta, 1874.

* Assam Revenue Survey: District of Nowgong. Scale 1 m. = 1 in. 13 sheets. Calcutta, 1875.

† Chota Nagpore Topographical Survey. Sheets 1, 5, 6, 9, 10, 15, and 23. Calcutta, 1874.

‡ Ganjam' and Orissa ,Topographical Survey. Scale 1 m. = 1 in. Sheets 40 and 70 (old series). Calcutta, 1875.

§ Kumaon and Gurwhal Survey. Scale 1 m. = 1 in. Sheets 7, 13, 35, 36, 37. Calcutta, 1875.

‖ North-West Provinces Revenue Survey: District of Bareilly. Sheets 3, 5, 9, and 11. Calcutta, 1875.

¶ North-West Provinces Revenue Survey: District of Bijnour. 7 sheets. Scale 1 m. = 1 in. Calcutta, 1875.

** Punjab Revenue Survey: District of Dera Ghazi Khan, Index map. Scale 8 m. = 1 in. Calcutta, 1875.

†† Bhawulpoor State, 1869-75. [Scale 1 m. = 1 in. Sheets 1—9, 12, 13, 14, and 19. Calcutta, 1875.

‡‡ Cantonment of Erinpoora in Rajputana (Serohi), 1873. Scale 6 in. = 1 m. Calcutta, 1875.

City of Nyanagar in Rajputana (Maiwara), 1874. Scale 6 in. = 1 m. Calcutta, 1875.

Gwalior and Central India Topographical Survey: Plan of the City and Cantonment of Goona. Scale 8 in. = 1 m. Calcutta, 1875.

Kattywar Topographical Survey: The Town and Cantonment of Rajkot. Scale 12 in. = 1 m. Calcutta, 1875.

Log Book.

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An Arctic Fossil Saurian.—When the late Admiral Sherard Osborn made his long Arctic journey, in 1853, from Northumberland Inlet to Melville Island, he picked up a fossil under Mount Rendezvous, at the extreme north-west point of Bathurst Island. It was 150 feet above the sea, and in a carboniferous limestone formation. Admiral Osborn, on his return, gave the specimen to Mr. Salter, who handed it on to Dr. Carte of the Dublin Museum, who has only recently placed it in the hands of Mr. A. Leith Adams for description. The specimen is that of a vertebra, probably one of the middle cervical vertebræ of a saurian about 12 feet long; and Mr. Leith Adams has very appropriately named this new Arctic lizard, *Arcto-saurus Osborni*.

Dutch Geographical Enterprise.—There will be a meeting of the Dutch Geographical Society at Amsterdam on the 4th of December, which will be occupied in considering the subject of equipping a Sumatra exploring expedition by private subscriptions. If this succeeds, then attention will probably be turned to Arctic exploration. The letters from Lieutenant Beynan (who accompanied Captain Allen Young in the 'Pandora') to Commodore Jansen, have been published in Holland, and have made a very favourable impression on the public. They have roused the slumbering energies of one ancient whaling city, Enkhuizen, where a section of the Geographical Society has been started to renew the old whaling enterprises and voyages for Polar discovery. This is the first expression of a gradual movement in the right direction. The Dutch are slow in getting under weigh, but when once in motion they steadily persevere; and all genuine lovers of geographical research in this country will watch such movements as this which has been commenced at Enkhuizen, with cordial and friendly interest.

Storage of Water in Peru.—A speculating clique has, for its own purposes, been busily engaged in calumniating the Peruvian nation in order to bring down its securities. Two things are, however, certain, namely that the money lent to Peru is lent on substantial security, and that it has been spent on works of great public utility. Among these are the dams constructed near the snow-line of the maritime cordillera of the Andes, at the sources of the Rimac, in order to augment the supply of water at Lima during the summer months. These grand works, designed by Señor Derteano, have now been completed, and the water which will thus be stored, and prevented from running to waste during the winter, amounts to 30,000,000 cubic metres. The works have recently been visited and approved by Señor Garcia y Garcia, the able diplomatist and negotiator of the treaty between Peru and China, who is now Minister of the Interior.

Among other great Peruvian public works, recently constructed, are the mole and harbour at Callao (see our number for June 1875, p. 185), and the railways, described in our number for June 1874, p. 89. The substantial securities for the regular payment of interest on the debt are the guano deposits, which are described in our number for Dec. 1874, p. 370.

French Missionaries in Indo-China.—The Abbé Desgodins has sent home to the Paris Geographical Society a map of a portion of Indo-China where the frontiers of Tibet, Burma, Yunnan, and Patang march together. Of this country we know little beyond what Mr. T. T. Cooper has told us in the record of his attempt to penetrate into India, from the side of China. Some interesting information respecting the semi-independent tribes in the south of the tract referred to has been already given us by Father Desgodins, and will be found in our October number: on the present occasion we are also presented, in the October *Bulletin* of the Society, with an itinerary (dated November, 1873), from Yerkalo to Tseku. Father Desgodins' notes are very brief, owing to the fact that he was hurrying away from Chinese persecution at Yerkalo, and seeking an asylum with two brother missionaries at Tseku. He mentions one fact of interest, that the frontier line between Yunnan and the territory of Patang (which we presume he would include as part of Szechuan) is not where the late Francis Garnier placed it, close to the village of Laluka, and in about 28 N. latitude, but a whole degree further north, being only three hours' journey S.S.E. of Yerkalo. For further details we would refer our readers to the map itself, which will prove of value in the construction of future maps of Indo-China, inasmuch as some of the chief places have, on the strength of recent observations made by Father Desgodins, quite a new position assigned to them.

Yemen.—A letter in the *Basiret* complains seriously about the manner in which the Turks govern that recently annexed territory. Nothing is done to introduce education or to improve schools; various tribes have been driven to revolt, in consequence of maladministration, and at this very time a revolted district is being punished. There is some talk about conquering the districts of Sade, Yam, and Marib, but it is believed that they would submit voluntarily if they saw the rest of the country prosperous and contented. No less than 900,000*l.* have been levied in taxes during the last four years, but not a penny of this large sum has been devoted to the development of the resources of the country.

Strabo's Geography.—F. Giuseppe Cozza has discovered fragments of the 8th and 9th books of Strabo's geography at the Abbey Grotta Ferrata, near Frascati. There are known to be in existence 28 manuscripts of this geography, the oldest dating back to the 12th century. The fragment now discovered is apparently several centuries older, and is all the more valuable as the 8th and 9th books have been known hitherto only from very defective copies.

A New Geographical Paper.—M. Vion, the director of a school at Amiens, and inventor of a universal language (*Système uniphonographique*) proposes to start a polyglot geographical paper.

Professor G. Bühler has started on a new tour of investigation and is now in Kashmir. Later on he will visit Jamû, Rajputana and Malwa. We are glad to say that he has already had signal success. He has found the Sutras of Lanjâkshi to the Kâthaka Sakha, with a commentary, also a great deal of profane literature. A Rigveda with a hitherto unknown

accentuation has turned up, as well as parts of the Kâthaka, of which only one manuscript, the one at Berlin, has hitherto been known. The Rigveda manuscript is handsomely written on Bhûrja in Sharada letters, and therefore inaccessible to the majority of Sanskritists. It is considered to be from 400 to 500 years old.

Professor Bühler has made a new collation of the Tarangini, which has supplied about 1600 emendations of the Calcutta aud Troyer Texts. Inscriptions and coins have also been found and the Pundits have helped Professor Bühler to identify many places, hitherto not determined at all, or determined falsely. A new translation of the work may be expected from Professor Bühler.

Correspondence.

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NOTES ON KARA KHITAI.

To the Editor of the "GEOGRAPHICAL MAGAZINE."

DEAR SIR,—The empire of Kara Khitai fills a notable place in the history of Central Asia in the century preceding the conquests of Jingis Khan. Like the empire of Jingis himself, it forms a centre about which we may integrate our facts, and gives us a broad canvas on which to fill in the details of that most crooked of histories, namely, the story of the revolutions of power among the Turks and other nomads in the earlier middle ages. In my last letter I attempted to fix the site of its capital Balasaghun; I should now like, with your permission, to collect some widely-scattered facts about some other cities within its borders, and also about some of the tribes which inhabited it.

I would begin with a notice which I have lately met with in Visdelou, showing that the capital of the Khan of the Western Turks was where I placed it in my former letter. Speaking of Tum-che-hu-Khant, the chief of these Turks in the early part of the 7th century, Visdelou says (apparently translating from the Chinese): "He moved his court to the north of the kingdom of Che (or, perhaps, Chach) to a place called in Chinese Tsien Tsuen, or the thousand sources."—(Visdelou Supplement to D'Herbelot's *Bibliotheque Orientale*, 110). This is surely no other place than the Ming-bulak or Ben-gheul I named in my former letter. I may add that in Dr. Bretschneider's admirable treatise on *Mediæval Chinese Travels in the West*, he places the capital of Kara Khitai on the Chu. The most important town within the borders of Kara Khitai after its capital, Balasaghun, was undoubtedly Almaligh, the site of which may be considered fixed. Colonel Yule has discussed the question with his usual skill and clearness in *Cathay and the Way Thither*, ccxiii., note.

The following notice, which is a valuable supplement to his remarks, is taken from the narrative of the Chinese traveller K'hieon, surnamed Chan Chung, in the beginning of the 12th century, and was translated by M. Pauthier.—*Journ. Asiat.*, 6 ser. 9,39. He says: "At length they arrived at the fortified town of A-li-ma, where reigned the King Pu-su-man. They lived in the 'Gardens of the Trees of the West.' The people of the West call this fruit Alima, whence the name of the town." This is literally true; the town took its name from its apple orchards, and "the trees of the West" are our apple-trees. The Chinese editor of the work adds the following valuable note:—"The great river which flows from east to west is now called the River A-li-ma-tu. A-li-ma in the history of the Yuen (*i.e.*, of the Mongols) is written A-li-ma-li. It is the fortified town of Ili. . . . The writers of the Thang dynasty call it Ili, in this following the official history of the Thang, which gave it this name from the River I-lih."

This confirms the remarks of Colonel Yule and others, and makes it pretty certain that Almaligh was, in fact, situated on the site of the Chinese town of Ili, the Kuldja of our maps. Now, as Balasaghun was the capital of an ancient Turkish principality, so was Almaligh of another. On turning to Raschid's account of the Karluks, we find him stating that Almaligh was their capital (*Erdmann's Temujin*, 246). Dr. Bretschneider says, that on an ancient Chinese map he has the Ko-z-lu-ye (*i.e.*, the Karluks are marked N.E. of Alimali). Erdmann tells us that Arslan Khan was their chief, who submitted to Jingis Khan, and gives us the names of his two successors. His grandson, Arslan Khan, married a daughter of Juji, the eldest son of Jingis.

Now, these Arslans Khans of the Karluks are no others, as I have stated in my previous letter, than the Lion Khans of Kashgar, who were the dominant Turks of Central Asia in the 10th century. They remained so, as I believe, until the time of the foundation of the empire of Kara Khitai, and their chief towns were Almaligh and Kashgar, which, curiously enough, upon the Mongol conquests, became the chief towns of the khanate of Jagatai.

In regard to the etymology of the name Karluk, upon which I asked for some information in my previous letter, I find that Abulghazi writes it Karlik, and says it means "a man of the snows" (*Abulghazi ed Desmaisons*, 20). The mountains south of Khotan are called Kharli Tau, which doubtless means "the snowy mountains." Their name is therefore probably equivalent to mountaineers, men of the snowy peaks. It seems quite clear that I was wrong in following Von Hammer in connecting their name with Kayalik, as, in fact, Colonel Yule had already warned me.

The position of Kayalik is a by no means easy question to decide. Let me premise by saying that both in Raschid and in the Tabakat-i-Nasiri the name occurs in the form Kabalik (*Erdmann's Temujin*, 336; *Tabakat-i-Nasiri by Raverty*, 154). This is no doubt a similar word to Bish-balig, and compounded of the well-known Turkish particle baligh or town, and of another particle Ka. In regard to this other particle I am going to make a bold guess, and to suppose that it may stand for Ko or Go. R and G are often interchanged as we find in Kadr Khan and Kur Khan, a form of Gur Khan, &c. If we may be allowed to make this alteration, the name would then stand Go-balig, *i. e.* Beautiful City. Now there is no trace of the name of Kayalik, so far as I know, before the foundation of the empire of Kara Khitai, and it seems to me to have been a city or town of their foundation. D'Ohsson for a long time misled me, as he may have misled others, by speaking of an independent prince of Cayalik named Ozar; but on comparing his account with the original account in Baschid, as given by Erdmann, it will be seen that he has blundered, and has created a prince of Kayalik out of the son of the prince of Almaligh (D'Ohsson, i., 111; Erdmann, 246). The fact is, there was no independent prince there so far as we know, and it was immediately under the authority of the Gurkhan. On looking over the map in search of a town with a name like Kabalik we shall very soon come across the Russian station of Kopal, which is surely the very same name. Now on turning to the discussion on the site of Kayalik raised by Colonel Yule, in *Cathay and the Way Thither*, we find him deciding from a correlation of the fragmentary evidence that it was some distance north of the Ili, four days' journey from the Alakul Lake, and he adds *it may be placed near the modern Russian station of Kopal*. This accumulation of evidence makes it very nearly certain that Kopal is in fact the site of the ancient Kayalik.

Another city of Kara Khitai was Imil, which was in fact the first settlement made by Yeliu Taishi, the founder of the Empire (Juveni D'Ohsson i., 442). Carpini mentions it under the name of Omil, and tells us

it was originally built by the Kara Khitai (D'Avezac, 751). He elsewhere says that Ogotai, the son and successor of Jingis, built a town called Omil, in the land of the Kara Khitai (*id.* 648). Ogotai was a famous restorer, and this was no doubt one of his restorations, the city built by Yeliu Taishi having probably gone to ruin like the old capital of the Uighurs in the East, Karakorum, which he also restored (*id.* 516). Imil then became the capital of his ulus or special appanage; and he and his son Kuyuk are described as returning home when they turned their steps towards Imil (D'Ohsson *passim*).

In the Yuan Shi Annals under the year 1252, it is said that the Emperor Mangu ordered the princes to return to their proper homes. Haidu, *i. e.* Kaidu, the son of Kuyuk Khan, and grandson of Ogotai, and the great rival of Khubilai, was sent to Hui-ya-li, *i. e.* Kayalik and Toto, another grandson of Ogotai, was sent to Ye-mi-li, *i. e.* Emil (Bretschneider *op. cit.* 70, *note* 39). Carpini tells us the emperor (*i. e.* the Mongol Khan Ogotai or Kuyuk) had a house there, to which he himself was invited as he passed that way, and where he was introduced to two of the emperor's sons (D'Avezac 751). The site of Emil we may fix with tolerable certainty. All the facts point conclusively to its having been situated in the valley of the river Imil or Emil, where Bretschneider was told by the Russian Captain Matussofsky that the ruins of an ancient city still exist. The same author tells us that on an old Chinese map of Central Asia, a place Ye-me-chi is marked north-east of Almaligh (*op. cit.* 70).

Carpini places his Omil near the lake with the boisterous wind, which has been shown by Colonel Yule and others to be the Alakul Lake; while in the travels of Changti we are told that after leaving the Kizilbash or Ulúngar Lake, and travelling westwards, he reached a city called Yeman, which Dr. Bretschneider identifies with every probability with Imil. From these various facts we may conclude with confidence that it was situated somewhere in the valley of the Imil, and very probably, as has been suggested, where Khuguchak or Tarbogatai now stands.

Between Imil and Almaligh was a route much frequented in mediæval times, and we are able to trace it with considerable detail. The traveller Changti tells us that south-west of Ye-man (*i.e.* Emil) he reached the city of Bolo, which is undoubtedly the Borotalas or Green Plain of the maps, which does lie to the south-west of Tarbogati. It is placed between Imishi, *i.e.* Imil and Alimali, *i.e.*, Almaligh, in the Chinese map quoted by Dr. Bretschneider, and it is the Pulad of Raschid (Bretschneider, *op. cit.* 70). To the north of this town he passed the Hai-tie Mountain, which, I believe, with Colonel Yule, is simply the Alla Tau Range, which is, in fact, just to the north of Borotalas. Klaproth abstracts from Raschid an account of the defeat sustained by Arikbuka Khubilai's brother at the hands of Algu, which took place near the city of Pulad and the Lake Sout (*Klaproth Nouv. Journ. Asiat.* 283, Bretschneider *op. cit.* 70). The same author tells us that Sout-kul or Milk Lake is the name by which the neighbouring Kirghises still know the lake of Sairam, which is south of Borotalas, and close to it. The Mongols call it Chagan Sairim Nur, the White Lake of Peace (Klaproth *op. cit.* 282, note). It is, again, undoubtedly the Heavenly Lake of Chang Chun, which he describes as a splendid lake of about 200 *li* in circumference, enclosed on all sides by snow-topped peaks, which were reflected in the water. It is also mentioned in the *Si-yu-lu* as being situated on the top of the Yui Shan Mountains (*i.e.* the Talke or Borokoro Chain) and as being 70 or 80 *li* in circumference (Bretschneider, 32 and 114). Mr. Dilke, who has visited it, has described the same lake in your pages, and I take the liberty of putting his account by the side of those of the Chinese travellers. Speaking of Kuldja, he says, "in the mountains to the north is situated the lovely lake of Sairam Nor, at a height of 8000 feet, surrounded by snowy mountains and little plains and valleys, covered in summer with Khirghiz flocks" (*Ocean Highways*, 282). South of the lake, according to the *Si-yu-lu*, the land is overgrown with lin-kin trees, which form such dense forests that the sunbeams cannot penetrate (Bretschneider 114). Chang Chung says:—"Following the shore [of the lake] we descended in a southern direction and on either side saw nothing but perpendicular cliffs and rugged peaks. The mountains were covered to their summits with dense forests, consisting of birches and pines more than 100 feet high."

This rugged pass is, no doubt, the defile mentioned by Changti, under the name of Tie-mu-r-ts-an-cha. Timur means "iron" in Turkish, and the pass of Talki from Lake Sairam to Almaligh was known in the middle ages as the "iron gate" (*id.* 71, note).

From Almaligh there were apparently two routes to the west—one along the banks of the River Ili, past Almatu, which is coupled by Baber with Almaligh, both being mentioned in his memoirs as having been destroyed before his time. This, as Dr. Bretschneider has shown (*op. cit.* 33), was clearly the Russian fort of Wernoye, which is still called Alimatu by the Chinese. According to Semenof's map it is situated on a feeder of the Keskelen. A main head stream of the river Ili, is called the Little Almaty, another feeder of the same stream, is also called Almaty, and both spring from the flanks of a peak of the Alatau Range called Almaty (Petermann's *Mittheilungen*, ix. 351). This was probably the route followed by the Armenian Prince Haithon on his journey westward. He tells us that having passed the Sout-kul, *i.e.* the Sairam Lake, he arrived at Halnalekh, which is doubtless Almaligh, as Klaproth suggests: he then arrived at Ilan-balig, and afterwards passed the Ilan-su. Ilan-balig means "city of serpents," and Ilan-su "river of serpents." Klaproth identifies the latter with Ilan-bach-su, or "the river of the serpent's head," which, he says, is an influent of the Chu on its left bank (*Nov. Journ. Asiat.*, xii. 283, note 2). I can find no such stream mentioned in the maps before me, and am disposed to think that by Ilan-su the Chu is meant, and that the city of serpents is the Equius or Balasaghun already discussed. Having crossed the Ilan-su, Haithon traversed a branch of the Thoros or Taurus Mountains, and arrived at Talas. There was a second route from Almaligh to Transoxiana, which was adopted by the Chinese traveller Chang Chun, but I cannot, after some effort, trace his itinerary, nor am I at all satisfied with the notes upon it by M. Pauthier and Dr. Bretschneider. With our present materials it seems utterly unintelligible. Nor can I identify the town of Chumir, south of Almaligh, mentioned in the narrative of Chang-ti (Bretschneider, 72), unless it be the submerged town at the western end of the Issikul Lake mentioned by Semenof (Petermann's *Mittheilungen*, ix. 360). We have now very cursorily surveyed the main topographical points within the borders of the ancient empire of Kara Khitai. The boundaries of the country, properly so-called, may be roughly fixed at the Balkhash Lake on the north-west. The steppe of Bedpah Talas on the west, the Jaxartes on the south, the Tarbagatai Chain on the north, and the 82nd meridian on the east. This was probably also the special ulus or khanate of Ogotai and his family. Beyond these limits the Kara Khitai no doubt exercised the authority of suzerains over the Kankalis in the west, the Naimans and Kirghises in the north, the khanate of Samarkand in the south, and those of Almaligh and Bishbaligh in the east.

I remain, yours, &c.,

HENRY H. HOWORTH.

DERBY HOUSE, ECCLES.

Proceedings of Geographical Societies.

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ROYAL GEOGRAPHICAL SOCIETY.

Meeting of 15th November, 1875.

PRESIDENT'S ADDRESS.

THE President, SIR HENRY RAWLINSON, observed that the forty-sixth session opened under most favourable auspices, the list of new Fellows and candidates being the largest the Society had ever known. During the last twenty years the number of Fellows had risen from 1000 to 3000. Nor had there been any diminution of its influence and reputation. During the past year the Society had made itself felt in various ways. They had the proud satisfaction of knowing that it was owing to their persistent and well-argued advocacy that the Government became convinced of the desirability of sending forth an Arctic Expedition—a conviction which the Prime Minister first communicated to the public through the President of the Society. On another recent occasion they succeeded in persuading the Government, at the last moment, to send a Commissioner to the Geographical Exhibition at Paris, an evil of some magnitude being thus avoided, for there can be no doubt that we should have suffered both in reputation and material interest if, of all the powers of Europe, England had been alone unrepresented at this great international gathering.

Sir Henry next briefly referred to the proceedings of the geographical section of the British Association at Bristol. After reviewing most of the geographical events which had taken place during the recess, he said:—

Equatorial Africa, to which the attention of geographers for so long a period has been prominently directed, again comes to the front as the scene of the most interesting and important exploration of the year. In my Anniversary Address of last May, I ventured to anticipate, from Mr. Stanley's well-known intrepidity and determination, that, being once launched into the interior of Africa, with means and appliances of the most extensive and efficient character, it would not be long before he had resolved the doubts which have existed since the first discovery of the Victoria Nyanza as to the true nature of that great Nile reservoir—that is, as to whether it was one large sea studded with islands, as maintained by the first discoverers, Captain Speke and Colonel Grant, or whether it was a mere collection of lagoons, as suggested by Captain Burton and Dr. Livingstone, on the strength of native information. This anticipation has now been realised, and I am enabled, through the kindness of the proprietors of *The Daily Telegraph* and *New York Herald*, to exhibit to this evening's meeting a complete chart of the lake, as delineated by Mr. Stanley, who for the first time has almost circumnavigated its shores. The narrative of Mr. Stanley's cruise round the northern and western shores of the lake, which was intrusted to M. Linant de Bellefonds, whom he met at M'tesa's capital on a mission from Colonel Gordon, was published only this morning in the columns of *The Daily Telegraph*. The other letters, however, despatched *viâ* Zanzibar, and published some weeks ago, have acquainted us with all the main features of this most remarkable journey.

Sir Henry then gave a *résumé* of Mr. Stanley's explorations, which will be found fully dealt with in our present number. He then continued:—

Mr. Stanley intended, after completing his survey of the Victoria Nyanza, to cross the intervening country to the Albert Nyanza, where he hoped, by means of the 'Lady Alice,' to make a second voyage of discovery round this hitherto almost unvisited lake; but more recent intelligence from the Upper Nile leads us to expect that he will have been anticipated in this second achievement by Colonel Gordon, or by some officers of the Upper Nile command, as it appears that a steamer has at length forced its way to a point above the principal rapids, from whence the passage to the Albert Nyanza is tolerably free from impediment. This important news is contained in telegrams of two different dates in August, sent by Colonel Gordon to General Stone, Chief of the General Staff at Cairo, and as an inaccurate *résumé* of their contents only has yet been published in England, I am glad on the present occasion to have the opportunity of reading to you the text of the documents, from copies which have been sent to me from Egypt by Sir Bartle Frere.

(1.) *Telegram of August 14th*, 1875.—The Arabic text of the telegram is very confused, but the contents appear to me to be as follows: "We are arrived near to Appudo. They tell us that the river is navigable from here to the mouth of the Asua. In ascending the river from Kerrie to this place we have passed two rapids. The steamer 'Khedive' has succeeded in passing the rapids of Beddin and in reaching Kerrie. This vessel will soon arrive here, that is, at Appudo. The force of the current here is very great."

(2). *Telegram of August 20th*.—"At this date we are in the province of Appudo, with officers and soldiers of Makedi. Some soldiers from the south have unexpectedly arrived, and have been added to those coming from the north. The Governor of Fatiko has written me a letter, in which he informs me that Kaba Rega has been intriguing among the Dongolawa irregulars, and inciting them to evil actions. M. Linant has arrived with his soldiers in good health. The Governor promises to write the necessary letters. M. Linant had met with Mr. Stanley at M'tesa's capital. Mr. Stanley stated that Lake Victoria Nyanza is very large, and contains many islands. He had navigated the lake from south to north, being quite alone, *i.e.*, without being accompanied by any European. Lieutenant Cameron was eight months previously on the banks of Lake Tanganyika, and desires to proceed towards the west. M. Linant had a fight on the road between M'tesa's capital and Kilware with Kaba Rega's people, near the place where Colonel Long had his battle. Mr. Stanley, having already seen the country on the east of Lake Victoria, desires now to pursue his explorations to the west. Communication between Ugandi, M'tesa's country, and Zanzibar, which had been open, is now impossible, owing to the hostility of the Karagwé tribes."

These brief telegrams are not very clear of themselves, as telegrams rarely are, but, read by the light of Colonel Gordon's letters, written during the months of May and June (and which have been published in Paris), supplemented by Lieutenant Chippendall's report of his exploration up the Nile, which was read at the Bristol meeting, they become sufficiently intelligible. Colonel Gordon appears, during the summer, to have forced his way, in Nile boats, or nuggurs, from Ragiaf to the mouth of the Asua, the difference of level between these points being over 300 feet. He established stations as he went on at Biddin, at Kerrie, and at Appudo. He was, at the latter place, 140 miles from the Albert Nyanza, at the end of August, and was preparing to try the ascent of the rapids at Makedo, 8 miles in advance, and where he had already established a station. The Pasha's steamer, 'Khedive,' in the meantime, taking advantage of the rise in the river, had followed in the same course, forcing her way up the rapids at Biddin and Kerrie, and having nearly reached Appudo by the last accounts. The great trial will be the passage of the steamer from Appudo to Makedo, where there are 8 miles of continued rapids and cataracts. Baker estimates one single fall at 40 feet. If the steamer, with the help of tow ropes, can reach Makedo, the further navigation to the lake, a distance of 130 miles, is without obstacle. Whilst Gordon was occupied with this ascent of the rapids, his assistant Chippendall had pushed on 70 miles beyond Appudo towards the lake,

and had conciliated the tribes of the neighbourhood, but had not succeeded in reaching the lake itself. Both he and Colonel Gordon report, from native information, that the Nile leaves the Albert Nyanza by two channels, but where the western stream rejoins the main river is still doubtful. Colonel Gordon is further inclined to give to the Albert Nyanza a general direction of east and west, rather than north and south. He would assign the greatest width of the lake to the latitude of Magungo, where Baker left it, and where a station is now to be established; and he doubts whether the water of this great basin stretches farther south than the Equator. A sketch-map of this part of the river by Chippendall has also reached us.

The news of Lieutenant Cameron here given in Colonel Gordon's telegrams, is, no doubt, of somewhat older date than stated, and was probably brought to M'tesa's capital by Arab traders from Unyanyembe. We know from Zanzibar that our envoy finally left Ujiji for the west at the end of May, 1874. Since this date no news of him whatever has been received at Zanzibar, although the direct route to Ujiji is more open than it has been for years past.

News of somewhat later date than these telegrams has since been received, to the effect that M. Linant, the bearer of Stanley's important letter, had been killed, with thirty-six of his followers, in an attack by the Bari tribe, when near Colonel Gordon's station. This lamentable event may possibly retard the execution of this officer's plans. Sir Bartle Frere informs me in a letter just received that his Excellency Nubar Pacha told him another telegram had been received which confirmed the report of young Linant's death and of Gordon's having been obliged in consequence to give up for the time his visit to the Albert Nyanza, in order to go and punish the tribe who had attacked the party. This is the second son that the venerable Linant Bey (the great irrigational engineer of Mehemet Ali and Ibrahim Pacha) has lost in that country. With regard to Colonel Gordon's expedition, Sir Bartle writes: "Everyone speaks most highly of Gordon and his doings—the Khedive and his Prime Minister, as well as the English residents and American missionaries. He has not only, so they all say, really checked the slave trade, and still more the slave-hunting, but he has made his expedition almost pay itself by economy and by judicious management of the conquered districts."

I have also much pleasure in announcing that his Royal Highness the Prince of Wales, the vice patron of our Society, has just sent to us, through Sir Bartle Frere, as the first geographical result of his tour in the East, a very interesting collection of route maps of Upper Egypt and its recently acquired dependencies, which have been executed in the Topographical Department of the Egyptian War Office, by General Stone, Chief of the Etat-Major, from materials furnished in one direction by Colonel Gordon, and the officers serving under his orders, and in another by Colonel Purdy and the officers of the Darfur Expedition. These maps, which contain much new geographical matter, and which give an earnest of the valuable aid we may expect to receive in the future from General Stone's well-organized department, were presented to his Royal Highness, under special instruction from the Khedive, by his Excellency Nubar Pacha, the enlightened Foreign Minister of the Egyptian Government, than whom there is no better friend to geography in the East.

Allusion was next made to the German Expedition to West Africa, from which so much was expected, but which was unable to penetrate into the interior in the vicinity of the Congo, the same obstacles which baffled Lieutenant Grandy having again, in this case, proved insurmountable. On the East Coast of Africa, to the south of what is called the lake region, two British parties are at work, not, indeed, ostensibly for the purposes of geography, but still in very little-known regions, where every step in advance brings with it some discovery. Bishop Steere, in the first place, left Zanzibar about two months ago, accompanied by Mr. Alfred Belleville and two other gentlemen, and piloted by Chumah and Susi, Livingstone's two faithful servants, on a benevolent and important mission. The party, indeed, proposed to cross from Lindy Bay, near the mouth of the Rovuma River, to the eastern, or rather to the north-eastern, shores of Lake Nyassa, where they hoped among the friendly Ajao tribe to find a convenient site for the establishment of a missionary station. The other party is that conducted by Mr. E. D. Young, which left England in May last for the purpose of founding a mission station on the southern shores of Lake Nyassa, the friends of the late Dr. Livingstone, in Scotland, having subscribed a sum of about 12,000*l.* for the endowment of this memorial station, to be named Livingstonia, and from whence, it is hoped, civilization and Christianity may be gradually diffused through the valleys of the Zambesi and its affluents. By the last accounts, Mr. Young's party, after experiencing some delay at the mouth of the Zambesi, in putting together the steel boat which they had taken out with them, had departed up the river on their interesting and hopeful mission.

After briefly referring to the work accomplished in the way of the exploration of Palestine, Sir Henry turned to Central Asia, observing that many valuable additions have been lately made to our knowledge of the country, between the Russian frontier and Afghanistan, the result being that by means of Captain Trotter's recent work, and the Russian explorations, geographers will be able, at length, to construct a reliable map of the region between the Upper Oxus and Jaxartes; which will be further improved, if it be true, as stated in the Russian papers, that, after the complete reduction of Kokand, troops will march from Khojend to Germ in order to bring under control the extensive dependency of Karategin.

The island of New Guinea had for some years past attracted much attention, and in the future, probably, it will attract still more attention; for it is almost impossible in the present state of the world, when the nations of Europe have subjugated or colonized so many lands belonging to the Indian Ocean, the Chinese Seas, and Polynesia, that this magnificent island, the queen of the Eastern Archipelago, and immediately contiguous to Australia, should remain much longer in isolated and barren independence. Having noticed the failure of the Italian traveller D'Albertis to obtain a firm footing in the island, and of the Maclay Expedition, of the London Missionary Society, to penetrate the rivers on the south-east coast, the President said that within the last day or two further intelligence had been received from Mr. Stone, which is of great interest. It is the discovery of a river on the south coast of New Guinea, which is navigable for nearly 100 miles into the interior, and which has been actually ascended by the Rev. S. Macfarlane and Mr. Stone, in the London Missionary Society's steamer 'Ellengowan,' for a distance of 60 miles. It is proposed to call this the "Baxter River," after Miss Baxter, of Dundee, to whose generosity the London Missionary Society were indebted for the presentation to them of the 'Ellengowan' steamer, by means of which the southern part of New Guinea has been thus, for the first time, explored.

In conclusion, Sir Henry alluded to the proceedings of the Arctic Expedition.

Mr. WATTS then read a paper on his

JOURNEY ACROSS THE VATNA YOKULL IN THE SUMMER OF 1875.

UPON his arrival in Iceland Mr. Watts proceeded first to examine the glaciers upon the south of the Vatna Yokulls and found that the part of the Vatna known as Breithamerker Yokull had recently advanced to such an extent as to threaten to cut off all communication along hat part of the southern shores of Iceland.

Accompanied by twelve Icelanders, he set out on the 24th of June, from Nupstad, a farm on the south base of the Vatna Yokull, and proceeded up the west side of the valley of the Dinpá, which river finds its way over a lava stream flowing from the Vatna Yokull. Arriving at the foot of the Yokull, Mr. Watts commenced the ascent of the frozen mass, but a heavy fall of snow soon compelled him to encamp. Next morning brought only snow and fog; but knowing the locality well an advance was attempted. After an hour's dragging, the fog and the storm increased, and in a short time the snow was so deep and soft as to prevent further progress until its surface was sufficiently frozen to bear. The weather clearing in the evening, an advance was again made, but the snow being up to their knees a bank was erected to windward and they turned in. The thermometer registered 20° Fahrenheit of frost. By 3 A.M. they were again under weigh; it was a lovely morning, the wind north-west, and as the sun illuminated the magnificent snow slopes everything seemed to promise fair weather and success. They travelled merrily along the frozen snow until they reached Mount Paul, which is a cluster of one large and smaller eminences, rising to a height of 150 feet above the surrounding snow. Here an abundant supply of water was found. The mountain is composed of varieties of obsidian, varying from a highly vitreous obsidian to the grey stone variety.

At this point Mr. Watts sent back four of his men. The weather was execrable, and for two days it was utterly impossible to proceed. His compass had for some time been almost useless. In spite of the deepening snow, they again plodded on, resting every quarter of a mile, but encountering a violent storm were soon brought to the halt; and it was with great difficulty that camp was pitched, for the drifting snow filled up the hole almost as soon as it was dug. The storm lasted for two days. On the third day an observation was taken, and two black conical mountains were perceived, of no great height, one about 5 miles due north, and the other about 11 miles north-west. An excellent view of the Vatna Yokull Housie was here obtained, and the snow-covered ridges, or probably lava streams, leading up to its cone, were perfectly discernible. The next night brought a severe frost, and they again had to seek shelter from a hurricane and snow-storm at a height of 6150 feet. For three days and nights the pitiless storm beat upon their small encampment, but on the fourth day its fury abated, and a start was made.

After a perilous journey, combined with intense cold, the northern base of the Vatna Yokull was reached. A cluster of mountains, from which great quantities of steam were rising and hovering above their summits in a huge mushroom-shaped cloud, rose immediately to the north, while to the north-west lay a wide-spreading lava field: beyond all, the weird forms of fire-wrought mountains formed a fitting background. A huge tongue of glacier at this point swept down to a distance of some 10 miles beyond its most northern limit, as represented upon the map published by Oslen in 1844, from a survey made by Gunnlangssen in 1835. Snoefell was here caught sight of, and upon taking its bearings with the Smoking Mountains, which evidently were the Dyngjufjall, it was found that instead of being at the Kverkfjall, which was the point Mr. Watts had intended to strike, he was upon the east side of Kistufell, about 9 or 10 miles further to the west. They were astonished at being unable to see anything of the Yokull Sà, which, upon Gunnlangssen's map, rises at the foot of Kistufell. Descending, they found themselves in a large water-course, occupied, however, by an insignificant stream, which was easily waded across. No doubt this was formerly the bed of the Yokull Sà. The glacier had advanced completely over the route taken by Gunnlangssen in 1835, thus diverting the course of the river, which now rises in several arms from the extremity of this glacial tongue. Shortness of provisions compelled them to make a series of forced marches, in order to reach the nearest farm, viz., Grimstasher Es. Steering due north, they crossed a group of low volcanic hills, which were not marked upon the map; beyond these lay a desert of black sand, which the lava of the Odatherkrawn had entered at its south-west corner. In the middle of this small desert rose four eccentric-looking eminences, surrounded by a considerable lava field, the greater portion of which was buried in the sand; a closer approach showed them to be small volcanoes; these are situated in all probability upon a fissure in the centre of the plain. The lava that issued from these volcanoes is basaltic, or doleritic, and bears a close resemblance to the lava from the Myvatu Orceffi.

The ensuing morning the main arm of the Yokull Sà was reached. Here Mr. Watts decided on leaving his tent and the heavier part of his baggage, and strike for Grimstasher, crossing the Svarta (or black river) to the Vadalda Hills. This river rises in the Dyngjufjall, but is soon lost in the sand, re-appearing as the Svarta, which washes the south base of the Vadalda. These hills, although of no great height, command an extensive view to the south towards the Vatna Yokull, which can be easily reached by following one of two valleys, bearing respectively west and south-west. From here the first good view of Kverhrfjall was obtained; it appeared to be a cluster of conical mountains, and one huge crater on the north slope of the Vatna Yokull. This large crater, although partially filled with snow, was smoking at three points, but presented no other signs of activity. Having progressed about a mile upon the Vadalda, they were soon upon the pumice which was ejected last spring from the volcano of Oskja-gja. It has fallen in a line about 25 miles broad, from the centre of the Vadalda to the south of Hethubreith; this pumice has fallen from Oskja-gja in a band of continually-extending radii eastward to the seashore, destroying in its course six farms in the Yokull-daru, and injuring others in the immediate vicinity. This shows that the prevalent winds during the eruption of Oskja-gja must have been south-west. Two nights and a day, with short intervals of rest, brought them to the ferry of Grimstasher, where they obtained a boat and reached the farm of that name. The journey from Nupstad in the south to Grimstasher in the north, occupied sixteen days, twelve of which were passed among the regions of perpetual snow. Mr. Watts here remarked that nothing could exceed the pluck, perseverance, and obedience of the Icelanders who accompanied him, without whom he never could have crossed the Vatna Yokull.

Resting for three days, they started for the Odatherkrawn, in order to inspect the volcano whence the pumice had been this year erupted. It is situated in the southern portion of the Dyngjufjall Mountains, or Agskja, which means oval wooden casket. Proceeding across the lava and sand desert of the Myvatu Orceffi, to the little river of Gravalanda, upon the banks of which and those of its neighbour, the Luidà, they found good feed for the horses. It was upon the banks of these rivers, beneath the shadow of the snow-capped Hethabreith, that the last of the Icelandic outlaws found a shelter. Hethabreith is one of the highest mountains in Iceland. The banks of the Gravalanda were in places thickly grown with birch and salix, but the larger wood was dead.

A weary march across the pumice brought them to the little desert where their tent had been left. Proceeding to Dyngjufjall, these mountains were found to consist of a series of semi-detached sections, some of which had broken out in ancient times, and by their insignificant lava streams had helped to swell the widely extending lava desert of the Odatherkrawn.

These sections of mountains described a heart-shaped form upon the south, inclosing the Askja. This is a three-cornered piece of elevated land 4000 feet high, about 6 miles long and 3 or 4 miles broad; it is easily reached by a glen upon the north-east side of the

Dyngjufjall. The principal crater which erupted this year is situated in the south corner of the Askja.

The Gja is enclosed upon the eastern and western sides by mountains rising in some instances 1000 feet above the Askja Plain: they appear shorn of their inner faces by the violence of the eruption, forming perpendicular cliffs of great height. It is well worth going to Iceland to stand upon the summit of one of the surrounding mountains and look into the yawning Gja which opens at one's feet, its grim chasms and black pits all contributing to the general aggregate of steam and loam stench, and horrid sound, while behind stretches a wild waste of glen, desert, and mountain, a country mourning in ashes and howling with desolation.

Leaving the volcano of Askja behind them, and proceeding in a westerly direction, they perceived that the lava from the Odatherkrawn had entered the Askja upon its most western side, having run for a considerable distance up hill. Upon descending the Dyngjufjall to the west, a broad plain, barren and black with sand and lava opened before them; this was the Odatherkrawn.

There was the snowy mound of Skjaldbreith, spotted with protruding lava, with its curious tuft of rock at the top, somewhat similar to that on Hethabreith; further to the east lay Kistufell, and behind, all the white expanse of the Vatna Yokull sweeping the horizon from east to west, where it is apparently joined by Tindufell Tunafells and the Hofo Yokull, for from this position they could not see Sprengo Sands. Skjaldbreith is a mound of basaltic lava partially covered with snow, rising to a height of about 4000 feet. Eruptions from this mountain appeared to have taken more the form of prodigious boilings-over rather than that of terrific outbursts.

In conclusion, Mr. Watts said, while sojourning among the sheep pastures of the north, his attention was arrested by stupendous columns of smoke arising from the direction of the Myvatu Orceffi, and spreading out like phantoms of mammoth palm-trees amid the calm atmosphere of an autumn Sabbath morning. It was in the Myvatu Orceffi that the violent volcanic outbreaks occurred last spring. Upon emerging from a valley which runs through the hills of Myvatu, a line of some twenty columns of smoke proclaims the seat of volcanic activity; from the north end of these a conical mound about 150 feet in height is erupting with considerable violence, and is rapidly forming a cone within a large crater which had evidently been formed by a previous eruption; a column of cinders is being shot to twice the height of the volcano itself, and a copious lava stream is flowing from a breach in its most northern side and from a smaller opening at the base of the cone. We find thus, that the Vatna Yokull is a mass of ice and snow resting upon a nest of volcanoes; that its glaciers are rapidly increasing; that it is encroaching both upon the north and upon the south; and, granting that the Vatna is a fair specimen of the Icelandic Yokulls, that nothing can save Iceland from the advancing glaciers but a cycle of propitious seasons. We begin to recognise what an important effect this huge refrigerator has upon the climate of the north of Iceland; how it shields the northerland from the aqueous vapours which travel upward from more southern latitudes, receiving upon its broad shoulders an inordinate amount of hail and snow. We find the Odatherkrawn and the country immediately to the north of the Vatna to be a wilderness wherein the scissuric forces of Iceland are still keeping up their erratic character by breaking out where least expected. First they break forth amid the snows of the Vatna, then amongst mountains which for ages had smothered volcanic energies, then in the middle of a plain already rendered almost desolate by prehistoric outbursts. This eccentric shifting of volcanic force in Iceland may perhaps be due to the many cracks and fissures which doubtless already exist in the superficial rocks occasioned by the violent earthquakes which have from time to time convulsed the island.

A brief discussion followed the reading of the paper.

IMPERIAL RUSSIAN GEOGRAPHICAL SOCIETY.

THIS Society resumed its monthly meetings on the 8th (20th) October, under the presidency of M. R. Semenof.

M. Wilson, the secretary, drew attention to the chief geographical events which had recently taken place, among which he specified the Hissár Expedition; the expedition in North-Western China, of Lieutenant-Colonel Sosnofsky (of whose safe arrival at Saissan intelligence has been recently received); the journey of Professor Nordenskiold through the sea of Kara, and his ascent of the Yenisei; and the part played by Russia in the International Geographical Congress at Paris. With reference to the last subject, he mentioned that the government had greatly contributed to the success which Russia had achieved, by devoting special funds to defray the expenses of the organization of their section. The thanks of the Society were tendered to M. Khanikof, the Government Commissioner, for the devotion and ability displayed by him in his duties.

M. P. Semenof then delivered a short address, in which he congratulated the Society on its successful *début* at the Congress, and attributed this partly to the careful efforts of Count de Lütke and his coadjutors, and partly to the varied and extensive labours of such institutions as the Staff College, the Pulkhova Observatory, and the museum attached to the military schools.

M. Janson then read a paper on the general aspects of the Paris Geographical Exhibition, and after the election of some new members the meeting broke up.

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PARIS GEOGRAPHICAL SOCIETY.

THE first November meeting was held on the 4th, under the presidency of M. Delesse. M. Maunoir, the Secretary, announced that a merchant captain named Lorrain had recently fallen a martyr to the cause of geographical science. He had chartered a vessel at his own expense, with the object of exploring the western coast of Africa. The crew, mainly composed of negroes, had mutinied against their captain, and left him bound to a rock in the middle of the sea. Here his body was discovered by some Englishmen. Among other items of intelligence, M. Maunoir mentioned that M. Bonnin, another French traveller, has also fallen into the hands of some of the negroes on the Gold Coast, but there is good reason to hope that English influence will not suffer him to be ill-treated. M. Largean, who has been entrusted with the leadership of an expedition into the Sahara, has been warmly received by the Governor and the Chamber of Commerce in Algiers. Both General Chanzy and the Geographical Society have promised to contribute funds towards this undertaking, and some public meetings in support of it will be held in Algiers. An expedition has also been despatched to the Gaboon River under M. Savorgnan de Brazza.

M. G. Biard then gave a sketch of a scheme proposed by him for organizing a scientific tour round the world; the party to be composed of fifty travellers, each of whom would guarantee 800*l.* towards expenses.

Two papers followed, one by M. Duveyrier on Mr. Stanley's exploration of Lake Nyanza, and another by M. Malte Brun on the Arctic expeditions up Smith Sound, more particularly with reference to the progress and prospects of H.M.S. 'Alert' and 'Discovery.'

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DRESDEN GEOGRAPHICAL SOCIETY.

WE have received the Twelfth Annual Journal of the Dresden Geographical Society, which contains the following papers:—On the result of height observations made in Colombia and Ecuador, by Drs. Reiss and Stuebel; Notes on the religion and customs of the Mafoor Papuas in New Guinea, by Dr. Meyer; Sketches from Dardania and Albania made by Herr Rockstroh in 1874; A journey through the interior

of Finnmark, by G. Pauli; Ashurada, by Dr. J. C. Hantzsche, and Notes on magnetic declination and inclination, by Herr Kahl.

ASHURADA.

The article on Ashurada, by Dr. Hantzsche, is a very complete one, based on three visits made by him in 1855, 1859, and 1861. He describes it as a sandbank, about 1¼ kilometer in length and ½ kilometer in breadth. There is very little vegetation, and the few gardens are poorly stocked. Water is easily got just below the surface, and though brackish is not deleterious. The prevailing winds are from the north and west, while in winter and spring time a warm, dry wind blows from the direction of the forests on the mainland. The climate is moist, snow being of rare occurrence and rains frequent; it has the reputation among the Russians of being very unhealthy, and has, consequently, deterred many from settling there; but Dr. Hantzsche inclines to think that Ashurada is no worse than most other places on the south coast of the Caspian. The number of houses is about fifty: they are small, one-storied buildings, of clay and wood, and thatched with rushes. At the western end of the island is the house of the flag or commanding officer, and in front of it are four iron three-pounders. The old burying place is hard by, but corpses are now conveyed to the extreme point of the uninhabited peninsula of Miaukela and interred there, on Persian territory, at a depth of about six or seven feet. The dwellings of the families of the soldiers are to the north of the island, and a Russian church is also situated there. A broad road leads to the eastern end, where there is a barrack and a hospital with nine beds. Two Russian navy surgeons, one of whom finds work enough for several weeks in the year in Asterabad and Mazanderan, are attached to the hospital. The interpreter, Mirza Daud, lives further to the east of the island. He is an Armenian in the Russian service, and speaks, besides his native language, Tartar, Persian, Russian, and French, and has another house at Gez on the mainland. There is also an old Turkman named Khidr-Khan, who lives here and acts as a sort of go-between with the Russians and Turkmans. The furthest buildings to the east are a wooden store belonging to the then (*i.e.*, in 1861) new Trans-Caspian trading company. Some of the sailors work as bakers, carpenters, and blacksmiths, and the soldier are perfect jacks-of-all-trades.

The sea all around is so shallow that vessels are obliged to anchor at a distance, and communicate by boat, the favourite anchorage being opposite the south-east part of the island. A small, lightly-armed Russian transport vessel is usually stationed near the Persian coast at Gez, to keep an eye on the Turkmans, while some small gunboats do a like service along the coast northward. The arms are in most cases pivot guns, while the sailors, artillery, and infantry carry flint-muskets. The vessels are remarkable for their discipline and cleanliness. The crew and officers are usually changed every three years, and are under the orders of the flag-officer at Ashurada, who in his turn usually stays here for a rather longer period, and is dependent for instructions on the Admiral of the Caspian fleet, and also on the Russian Legation in Teheran. All things considered, Dr. Hantzsche thinks a vast improvement has taken place in Ashurada since the days when Holms and Abbott visited it in 1844, while frequent communication with Astrakhan, Baku and other ports supplies its inhabitants with the requirements of civilization. The Russians act the part of a marine police of Ashurada, but this is by no means relished by the Persians, who show their displeasure in a variety of petty ways.

Dr. Hantzsche concludes by pointing out that as from Gez, Asterabad and Ashraf, roads which can easily be made practicable for cannon lead over the passes of the Elburz, and that from Damghan, Shahrud and Bostam, main lines of road lead to Teheran in the north of Persia, to Isfahan and Yezd in Southern Persia, to the ever-unsettled province of Khorasan, and lastly to Herat and Kandahar, it is easy to see the enormous importance of Ashurada to the Russians.

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EGYPTIAN GEOGRAPHICAL SOCIETY.

November 12th, 1875.—Dr. G. Schweinfurth, the President, stated that application had been made to 250 Societies for an exchange of publications, but that up to the present time only twenty-five amongst them had responded to this appeal. Egypt had hospitably received many travellers, and supported generously several geographical explorations, and he trusted that this would be acknowledged abroad, and result in large accessions to their library. The geographical societies of Paris, St. Petersburg, Amsterdam, and Vienna, and the Academy of Metz, had promised complete sets of their publications. The German emperor had presented a copy of *Lepsius's Egyptian Monuments*, and many private authors had forwarded their works. The Society now numbered 300 members, about half of whom resided at Alexandria, and its annual income amounted to 1400*l*. The Khedive had treated them most liberally. He had placed at their disposal a suite of six rooms, and free railway tickets were granted to the members residing at Alexandria, to enable them to attend the meetings. The material condition of the Society left, therefore, nothing to be desired; but it was necessary that it should set about now to do some real work, or it would be looked upon abroad as a *mirage trompeuse*. The military character of most of the expeditions now engaged in the interior of the country precluded scientific work. Several expeditions of this kind were now in the field, and the Society might be charged abroad with not availing itself of the oportunities for exploration thus afforded. Men of science should be attached to these expeditions more frequently, but not those quasi-savants who had inundated the country, and whose incapacity was a matter of notoriety at Cairo. He called upon the members to use their best efforts for procuring information worthy of being printed in their proceedings.

General Stone protested against the statement that the members of his military expeditions were deficient in scientific requirements. They were not savants, strictly speaking, nor was it the object of military expeditions to promote science. Dr. Schweinfurth said that he fully appreciated the service rendered by the American officers to the country, and considered that they were invaluable. As President of the Society, however, he was bound to be egotistical, and for this reason he advocated scientific research independently of the military surveys. The Society not only desired to publish the maps, which resulted from the surveys made by officers of the staff, but likewise memoirs which illustrated them.

Linant Pasha, and the astronomer, Mahmud Bey, were then elected Vice-Presidents, and the Secretary of the Society, Marquis de Compiègne, read a report on the Paris Geographical Congress.

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